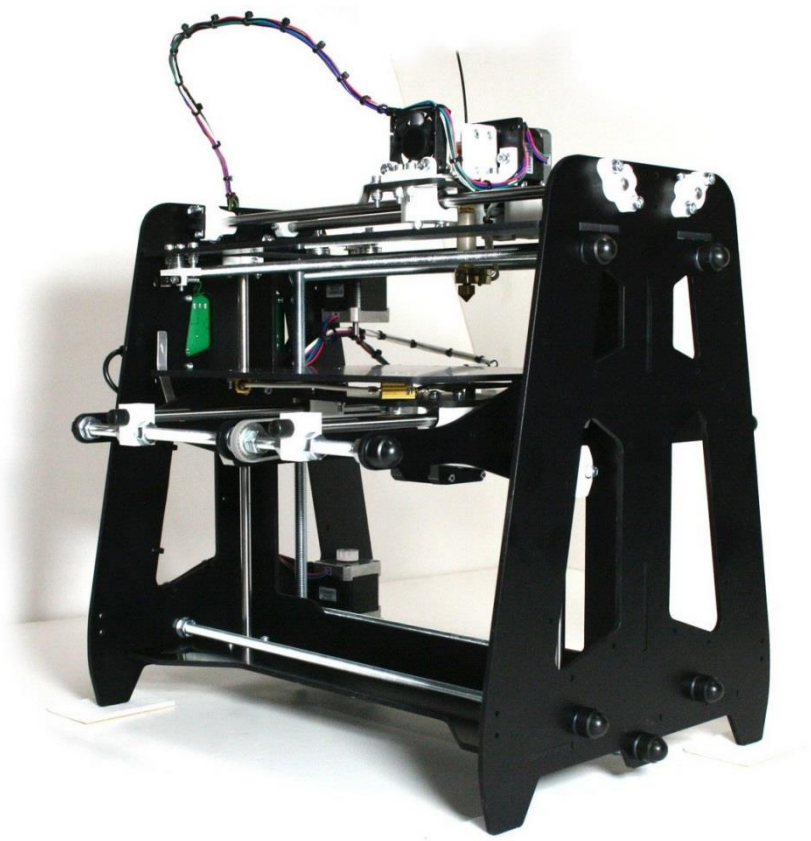
ORCABOT

Building Instructions: Orca



Building instructions: Orca

Version 1.1

January 2013

1. Introduction

This document contains the information to build your own Orca 3D-printer.
On our website you can also find our user manual. In this manual you can find the instructions how to start you printer and how to operate.

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Disclaimer

The influence of the builder of the printer is dominant, thus making him fully responsible for accuracy and safety.
We are always developing and improving our products. This can result that some pictures in this manual can have small differences from the parts you received.
When in use, some parts of the Orca will have high temperatures. Be careful that you will not touch these parts during printing or at least within a period of 10 minutes after printing.

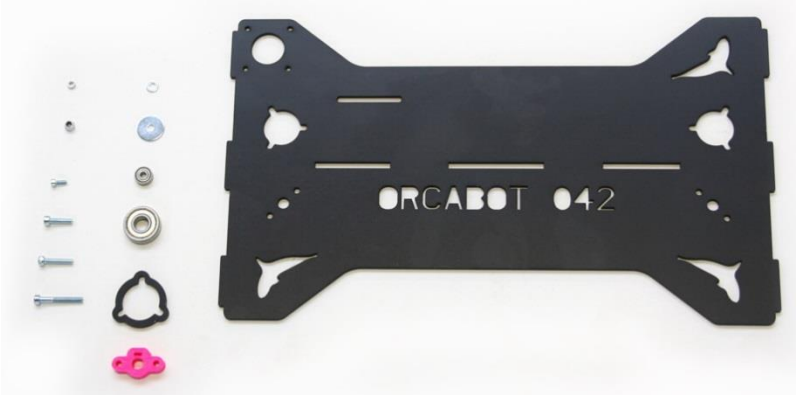
2. Bottom assembly

Parts list:

QTY	Description
1	Bottom Orca
2	Ring
8	Axle Holder
2	Bearing 6000ZZ (∅26mm)
2	Bearing 624ZZ (∅18mm)
8	M3 nut
8	M3x8
6	M4x16
4	M4x20
1	M4x30
11	M4 nylock nut
22	M4 washers
5	M4 ring (big)

Assembly description:

Step 01 - Preparation / collecting all parts



Step 02 - Assemble bearings

1x Bottom Orca, 2x bearing 6000zz, 2x ring, 6x Bolt M4x16, 6x M4 nylock nuts, 12x M4 washers (on both side). Put the washers with the flat side towards the bearings

Step 03 - Pre-assemble the Z-belt tensioner (1x)

1x M4x30 bolt, 2x bearing 624ZZ, 2x M4 washer, 4x M4 ring (big)

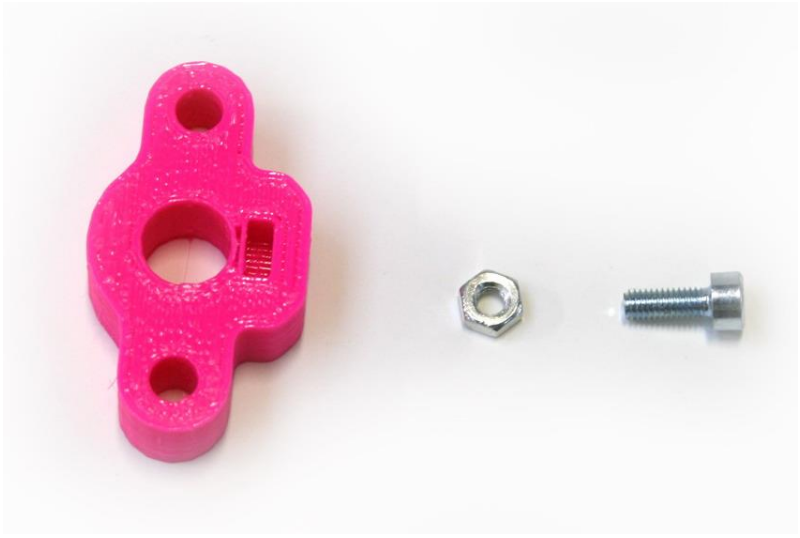
Step 04 - Fit the Z-belt tensioner

1x M4 nylock nut, 1x M4 ring (big).

Remark: do not fully tighten!

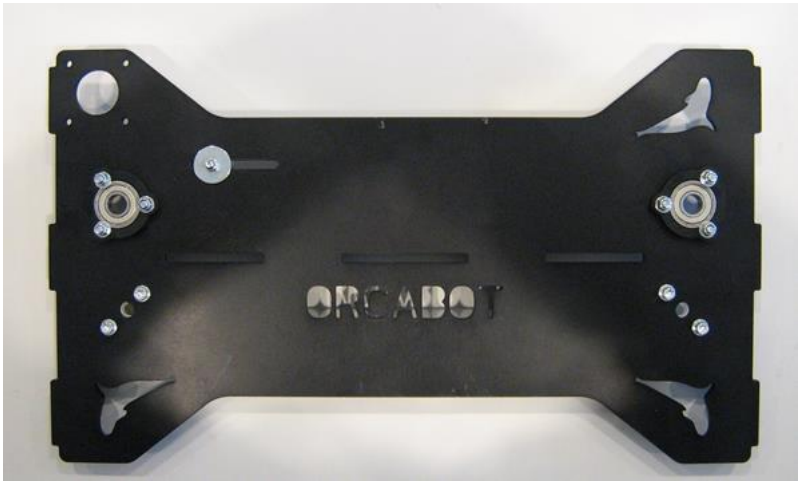
Step 05 - Preparation of axle holder parts (8x)

1x Axle holder, 1x M3x8 , 1x M3 nut.



Step 06 - Fitting the axle holder parts (2x)
2x M4x20 , 2x M4 nylock nut, 4x M4 washer.

Step 07 – Check Bottom assembly
Remark: double check everything / bolt directions / sides / washers / lengths etc.!


ORCABOT

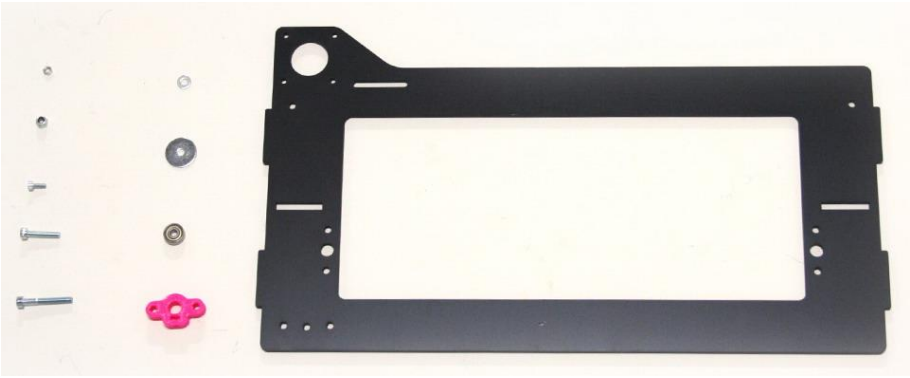
3. Top Assembly

Parts list:

QTY	Description
1	Top plate
1	Z-opto holder
1	LED holder
1	LED strip incl. cable
1	Opto sensor incl. cable
2	M3 nut
2	M3x20
1	M4 nut
10	M4 nylock nut
7	M4x20
4	M4x30
19	M4 washer
18	M4 ring (big)
2	Axle holder assembly (Step 01)
2	Nylon bearing
1	Spring

Assembly description:

Step 01 - Preparation / collecting all parts



Step 01 - Preparation

a. Glue a M3 nut in the opto holder.

b. Put the LED strip on the LED holder.

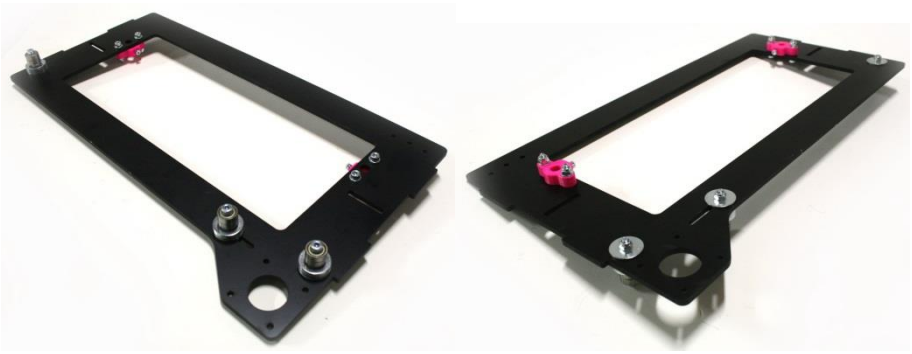
Step 02 - Pre-assemble the X-belt tensioner & 2x X-belt endpoints
1x M4x30 bolt, 2x bearing 624ZZ, 2x M4 washer, 5x M4 ring (big).

(x3)

Step 04 - Fit the X-belt endpoints & the X-belt tensioner
3x M4 nylock nut, 3x M4 ring (big)

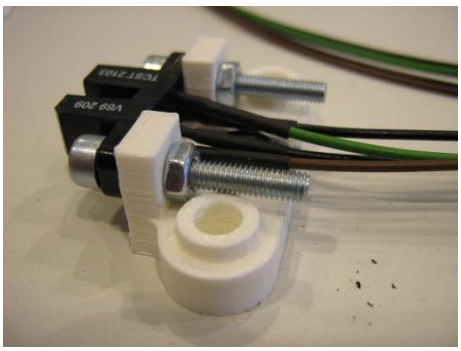
Remark: do not fully tighten!

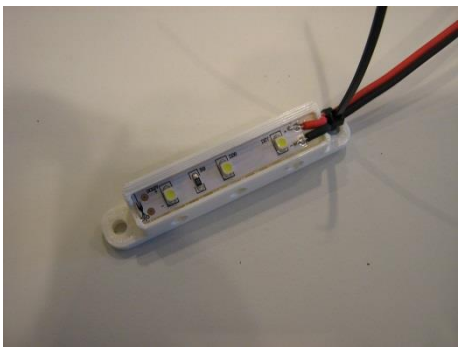
Step 06 - Fitting the axle holder parts
2x Axle holder assemble (Step 01), 2x M4x20, 4x M4 nylock nut, 8x M4 washer

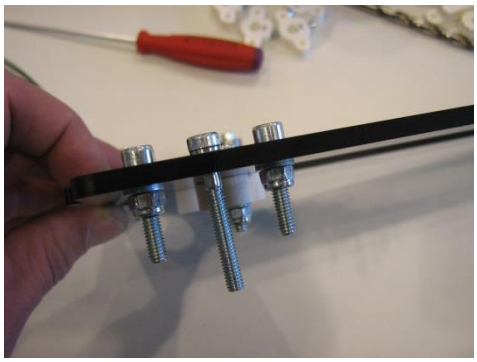


Step 07 – Prepare Opto- and LED-module

Remark: double check everything / bolt directions / sides / washers / lengths etc.!

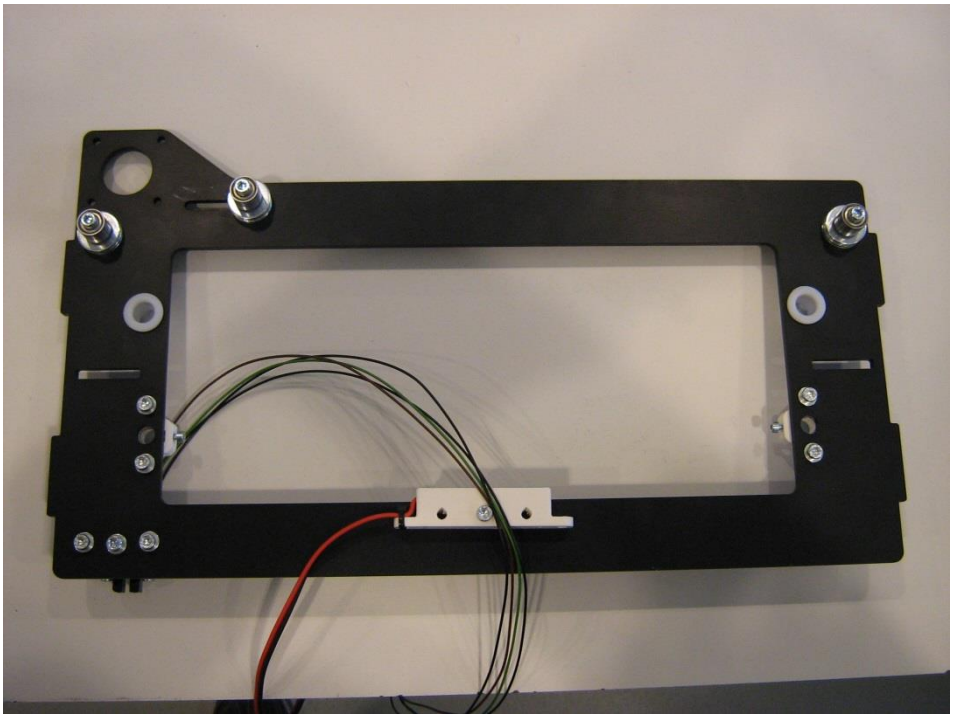






Put 2 bolts M4x20 and 1 M4x30 according to the picture.

Put the spring over the middle bolt and attach the optoholder with bolt. By turning on the middle bolt, you can adjust the height of the optoholder.



Step 07 – Check Top assembly

Remark: double check everything / bolt directions / sides / washers / lengths etc.!

4. Frame assembly

Parts list:

QTY	Description
4	Axle holder
2	Side plate
1	Mid plate
1	Bottom assembly
1	Top assembly
5	M8 x410mm
16	M4 washer
8	M4 Nylock nut
8	M4x20
20	M8 nut
20	M8 washer
10	Plastic nut cap

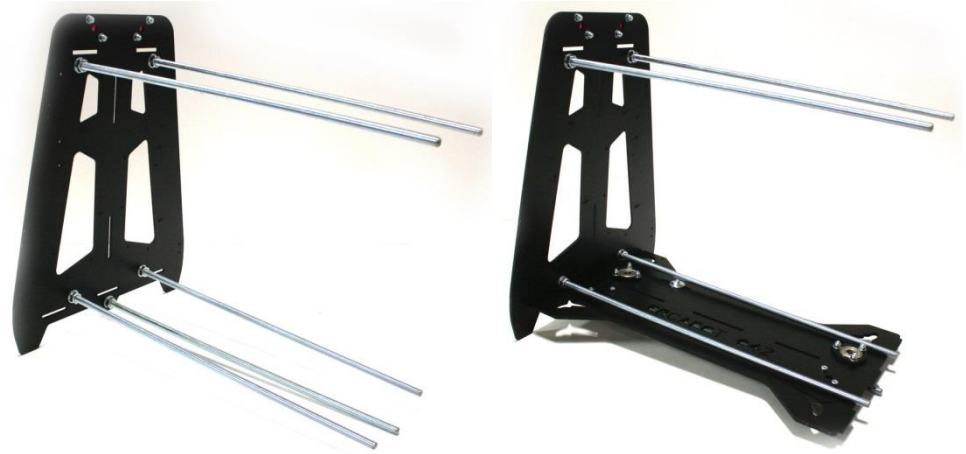
Assembly description:

Step 01 - Preparation / collecting all parts

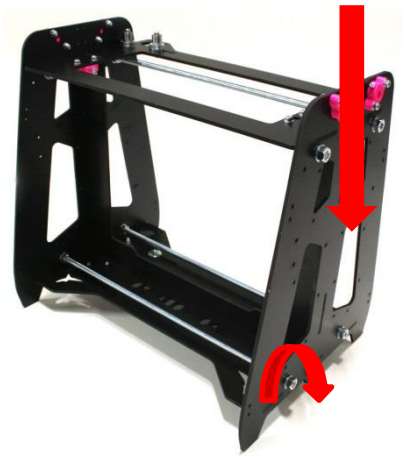
Step 02 - Fitting the axle holder parts

4x M4x20 , 4x M4 Nylock nut, 4x M4 washer (2x)

Step 03 - Assemble the frame



When putting the frame together it is important that there is NO TORSION at all in the frame. You can release the torsion by turning on the opposite nut. If the right corner is lifted up due to torsion, turn at the nu as shown in the picture.



Finish the assembly by putting on the plastic nut caps.

5. Preparation motors

Parts list:

QTY	Description
4	Stepper Motor

Assembly description:

Step 01 - Preparation of stepper motors

(note: best is to tape off the shaft/axle hole with some tape or clay to prevent metal swarfs entering the motor (=magnet).

6. Y-sides pre-assembly

Parts list:

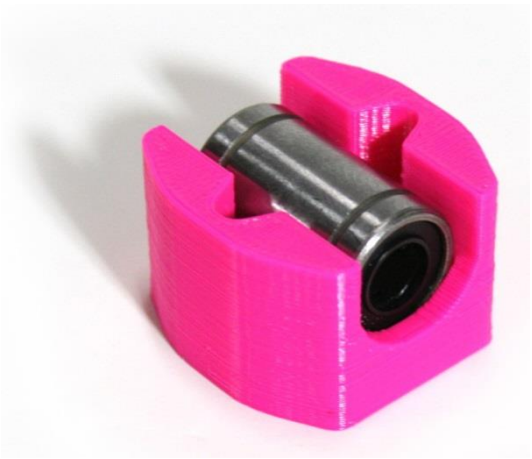
QTY	Description
16	M4 Nylock bolt
32	M4 Washer
8	M4x30
8	M4x35
2	AMCE nut
2	Driven Z-nut trap
10	Linear bearing holder
10	Linear bearing
2	Side frame

Assembly description:

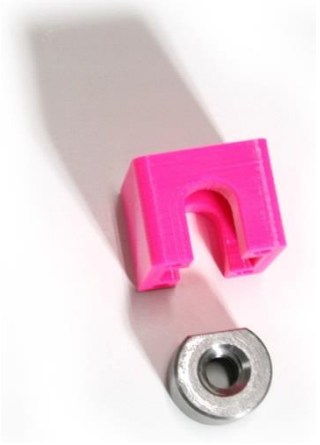
Step 01 - Preparation / collecting all parts

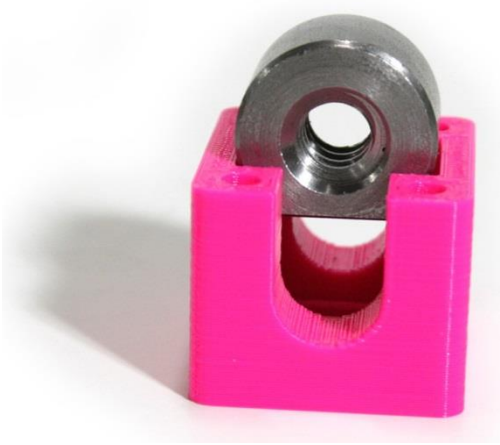
Step 02 - Preparation linear bearing parts (2x)

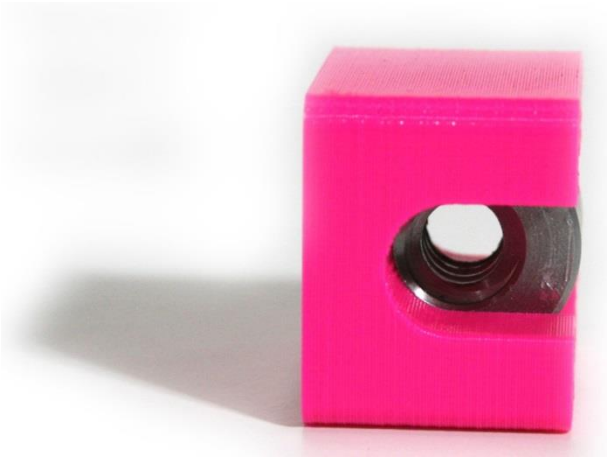
Push in the lm8uu bearing. You should hear a click / snap fit. Make sure the balls are positioned crossed -> X



Step 03 - Preparation of the two ACME nut holder parts (2x)



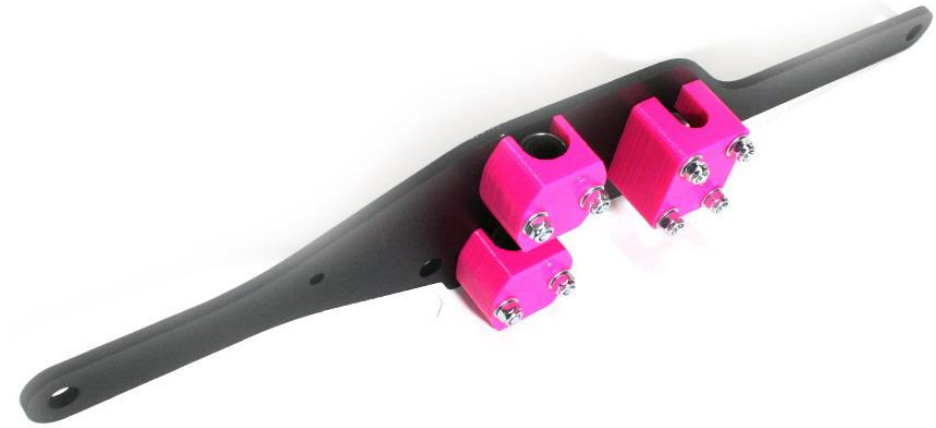




Step 04 - Assemble the Y sides (2x – mirror)
(note: there is a left and a right version)

Do not fully tighten the bolts/nuts yet, but tighten them almost (90-95%), so they are still able to move a bit (fully tightening will be done later in the frame).

Put washers on both sides.



7. YZ frame assembly

Parts list:

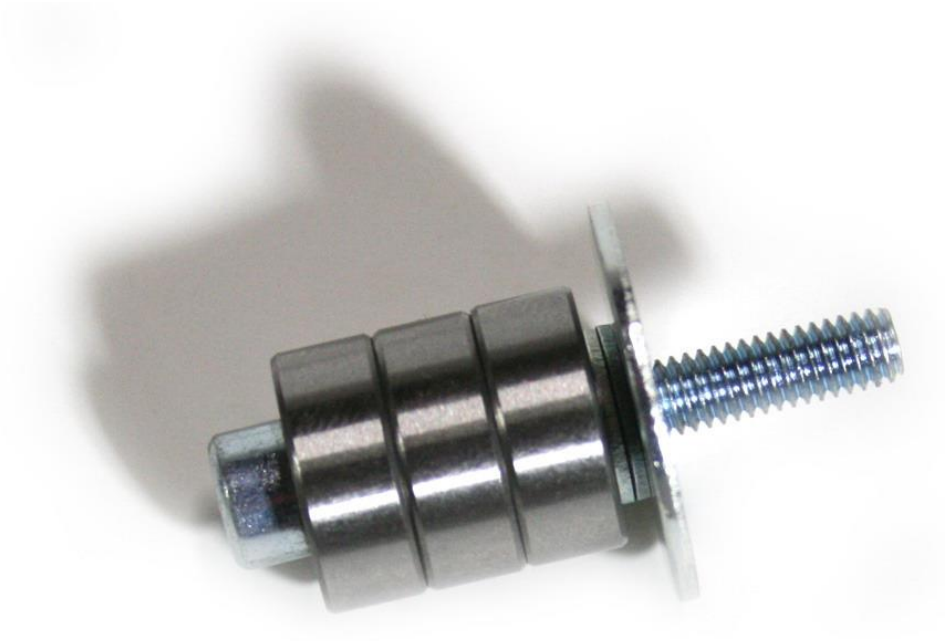
QTY	Description
4	M8x300
1	M4 nylock nut
2	M4 washer
7	M4 ring (big)
37	M8 nut
40	M8 washer
1	M4x35
3	Bearing
6	Bearing 624ZZ
1	Y-opto holder
1	Y-rod holder
1	Y-motor plate
2	Tool

Assembly description:

Step 01 - Preparation / collecting all parts

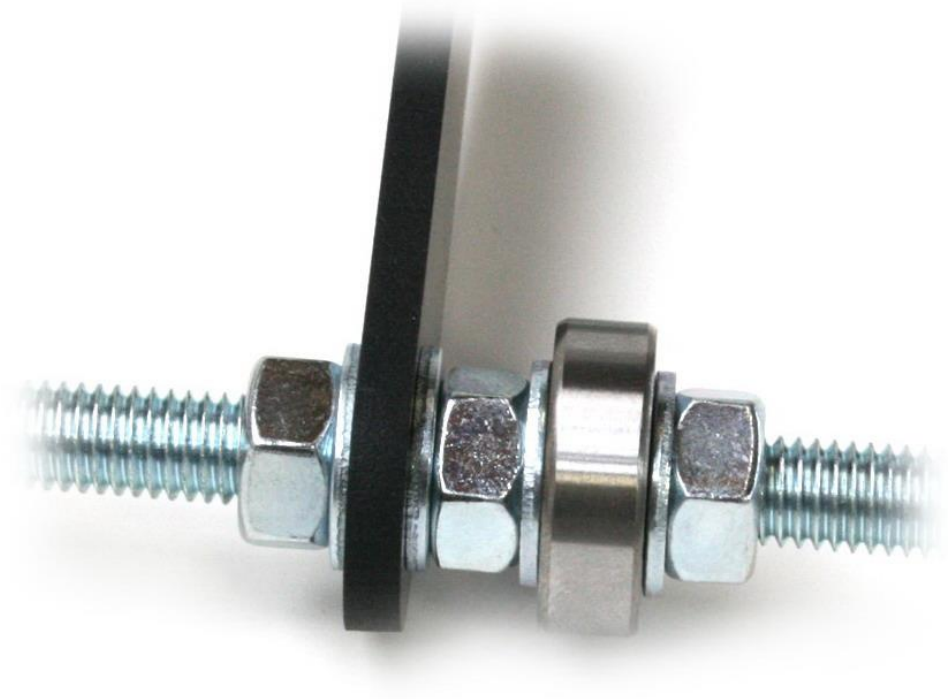
Step 03 - Pre-assemble the Z-belt tensioner

1x M4x30 bolt, 2x bearing 624ZZ, 2x M4 ring (small), 6x M4 ring (big)

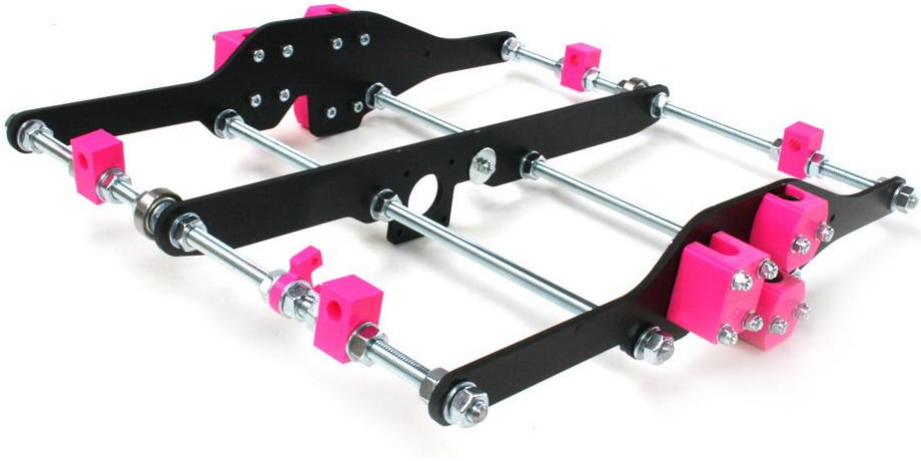


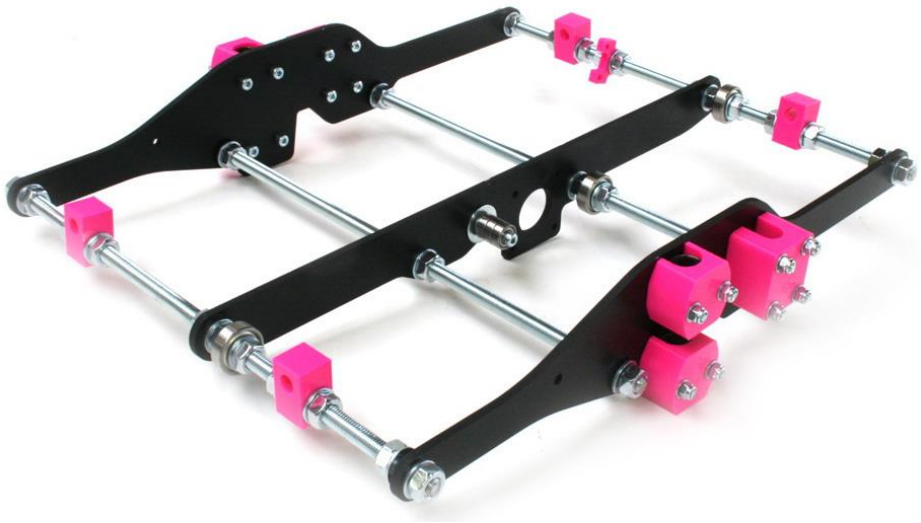
Step 03 – Assemble YZ-frame

Note: Nothing is tightened yet, everything is hand-tight, tightening is done after accurate measuring (next step).

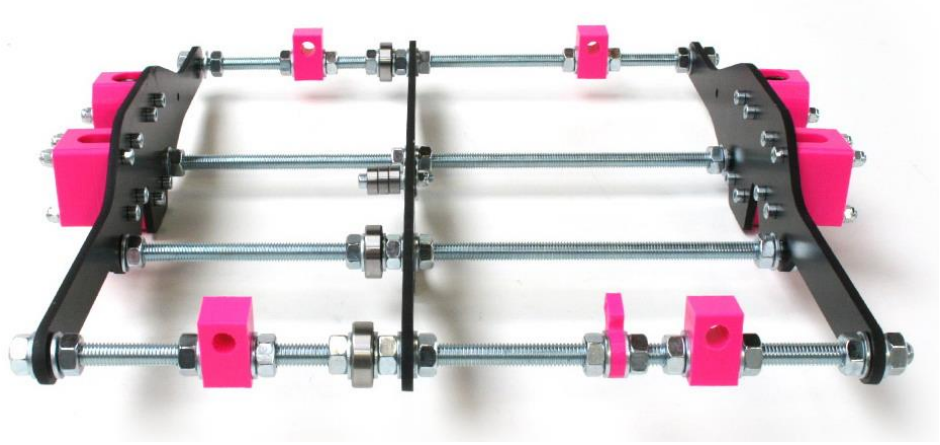


This is a rough measurement, with 300mm threaded rods the distances are roughly 128 & 168mm, note if you have 330mm rods, best is to cut them shorter, otherwise the M8 nut caps will not fit.





Everything is only hand-tightened in these pictures.



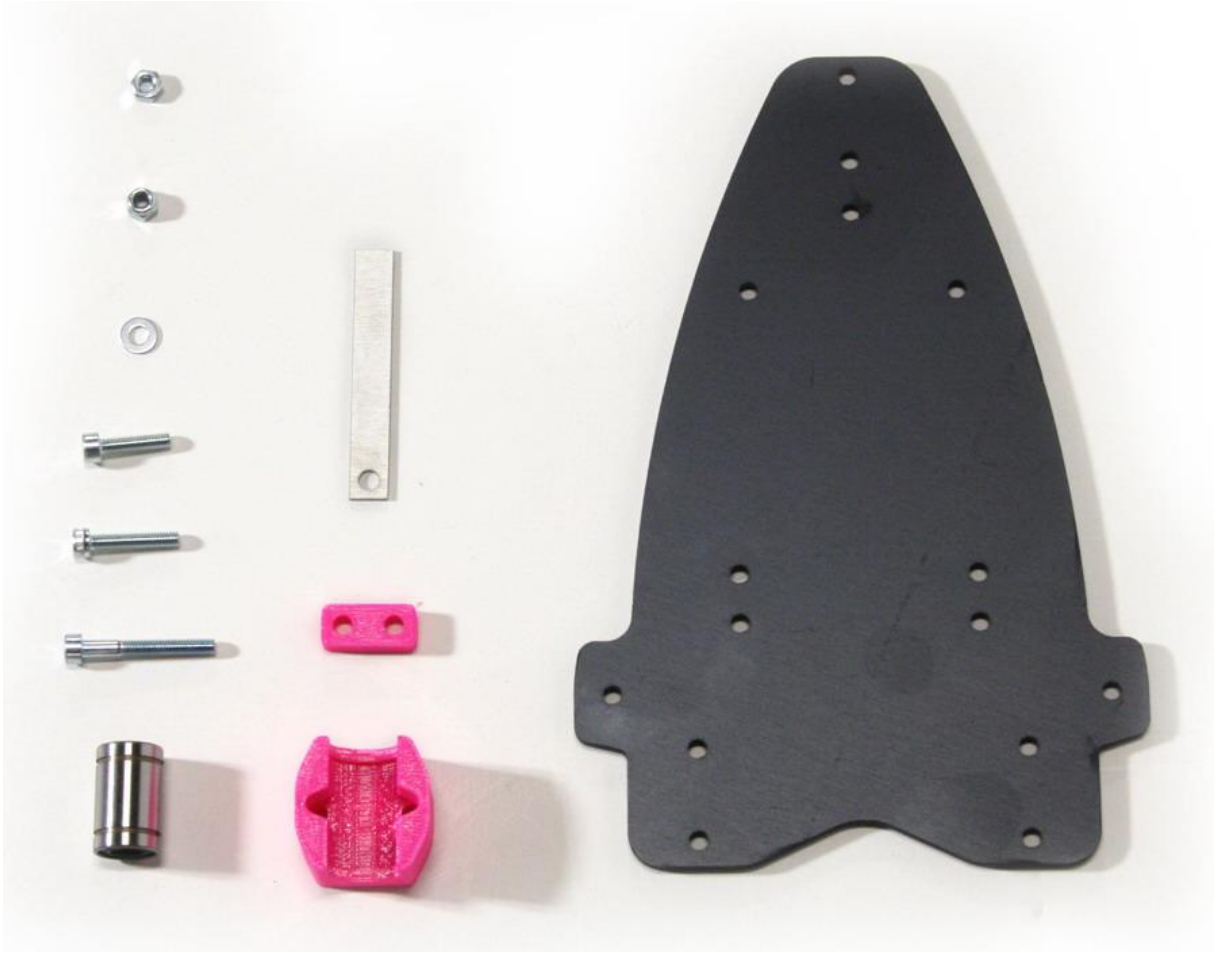
8. Y-fin pre-assembly

Parts list:

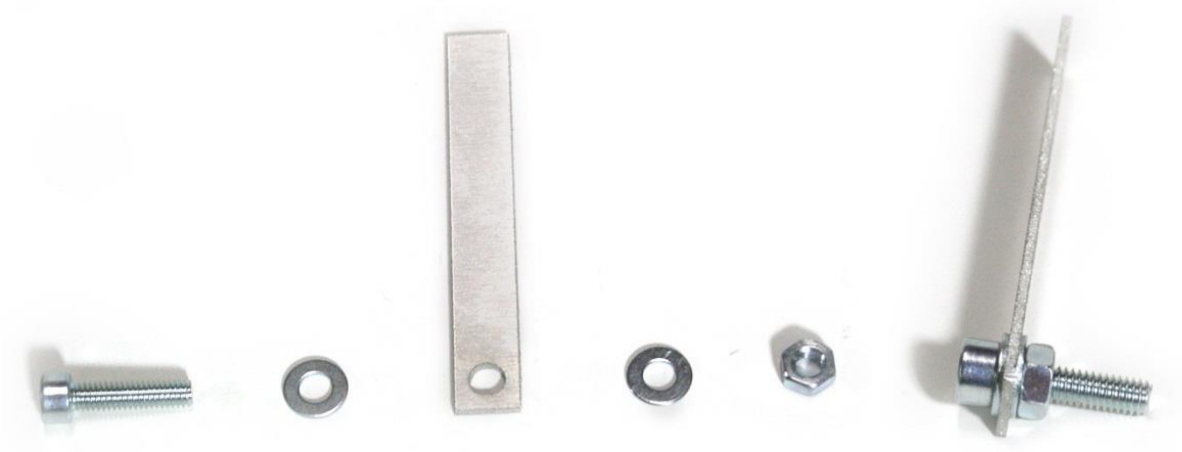
Drawingnr.	Rev.	QTY	Description

Assembly description:

Step 01 - Preparation / collecting all parts



Step 02 - Preparation of the Y optoflag



Step 03 - Assemble Y-Fin

Note: Only the Y optoflag is tightened, everything else is hand-tight, tightening of the lm8uu holders will be done once assembled in the YZ frame (next step).

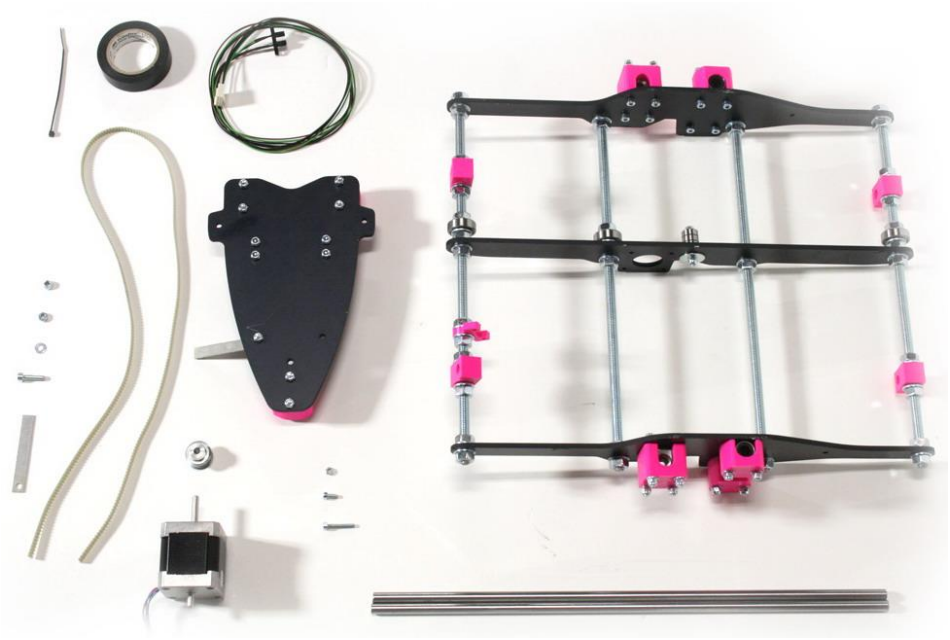
9. Fit Y-fin on YZ frame

Parts list:

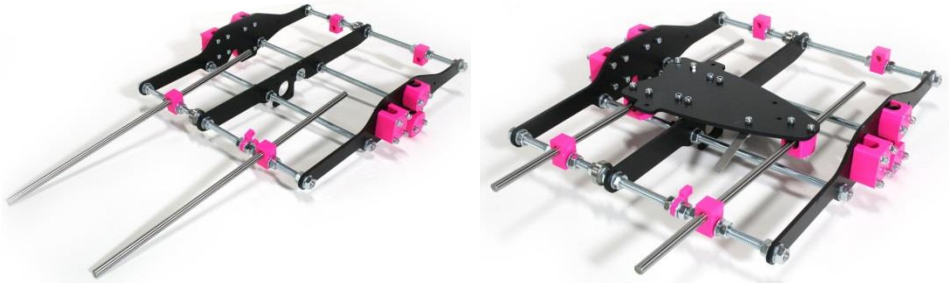
QTY Description

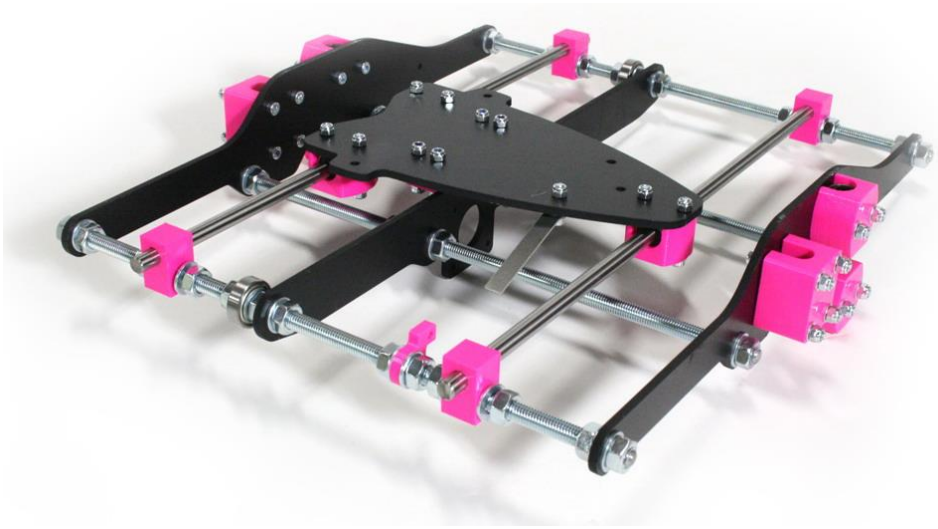
Assembly description:

Step 01 - Preparation / collecting all parts

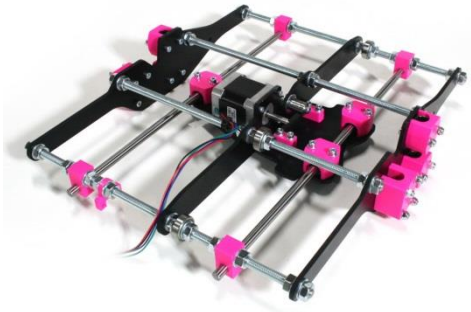


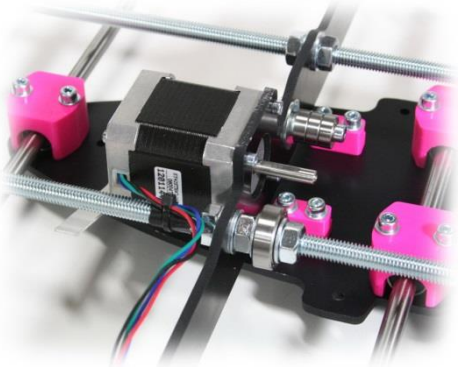
Step 02 - Preparation of ...

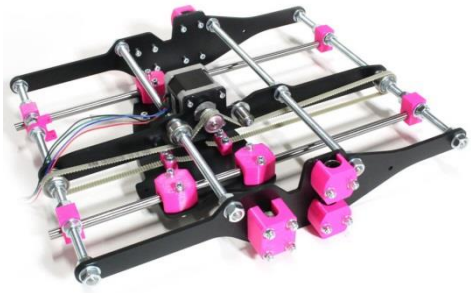


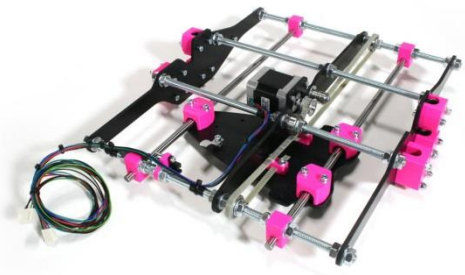


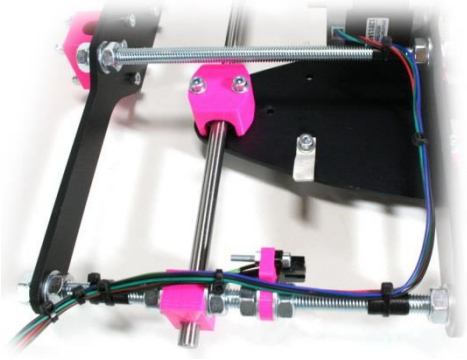
Step 03 - Preparation of ...

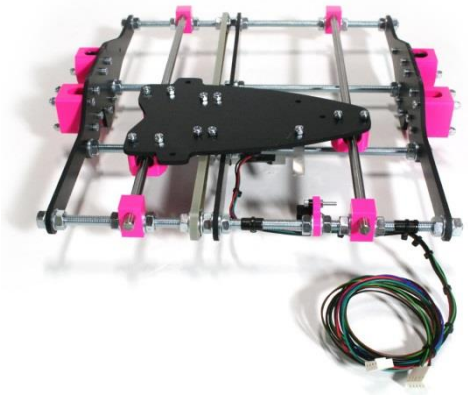


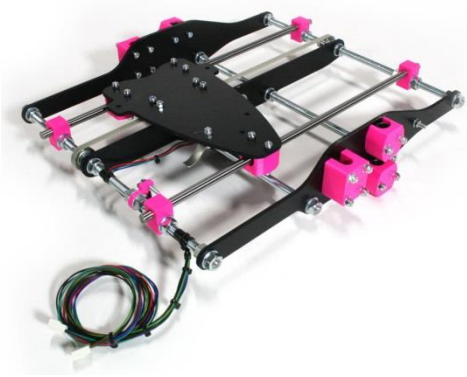


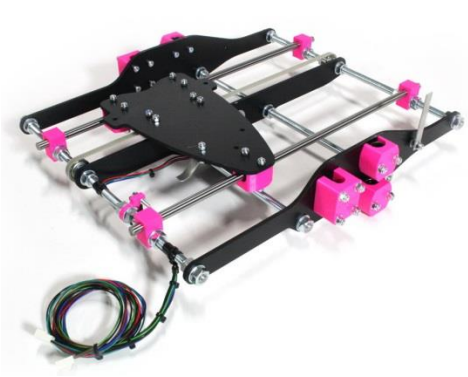


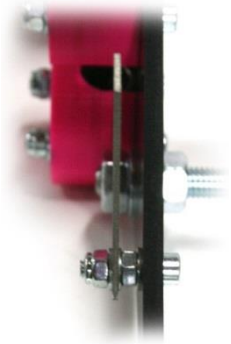












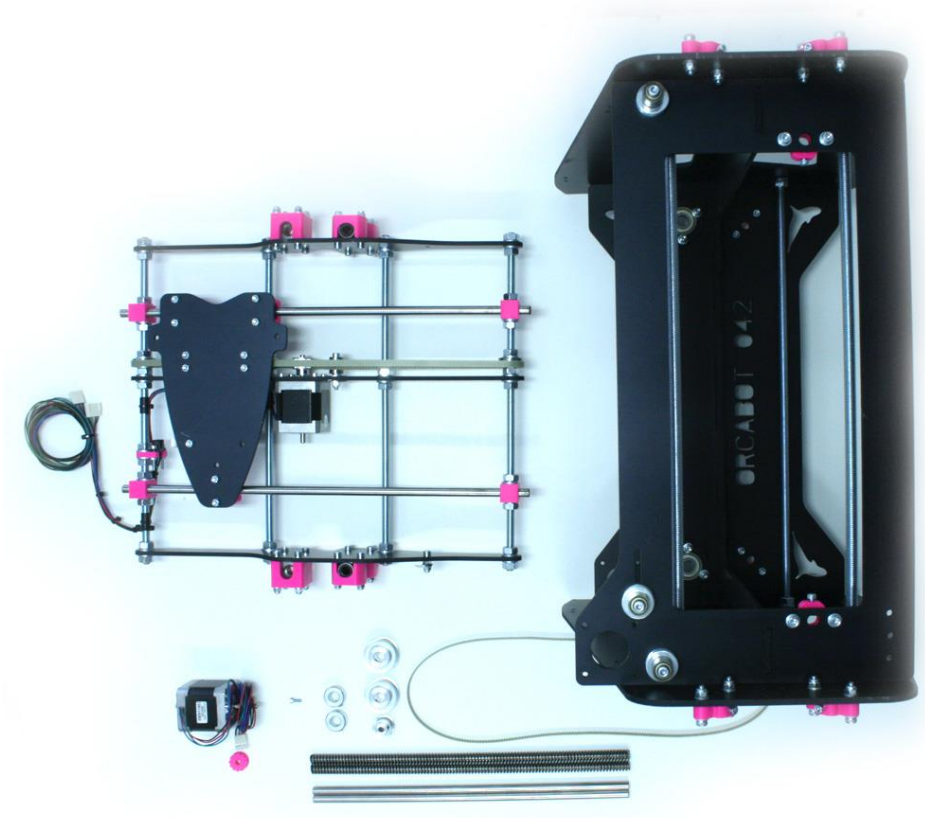
10. Fit YZ-frame

Parts list:

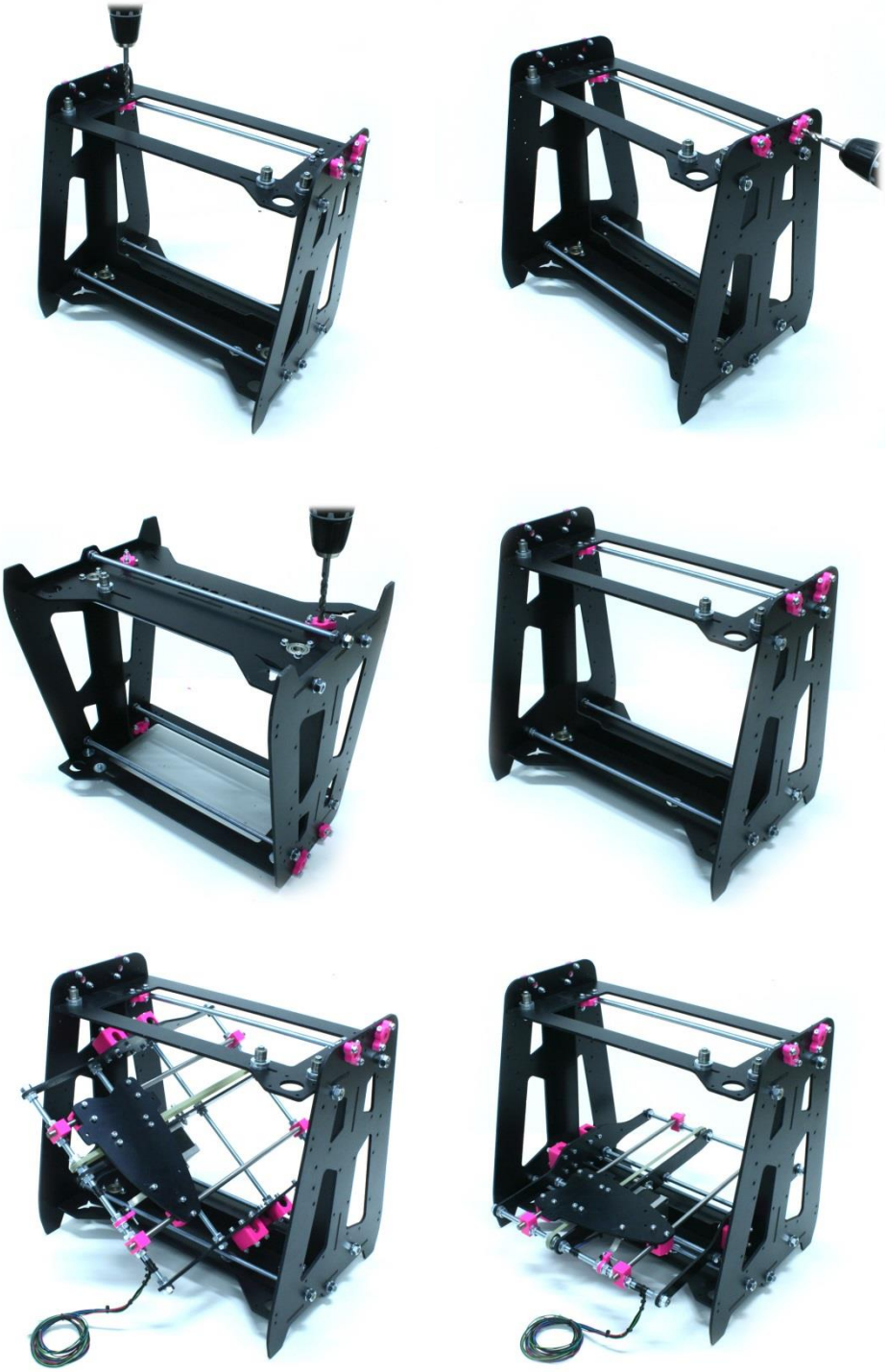
QTY	Description

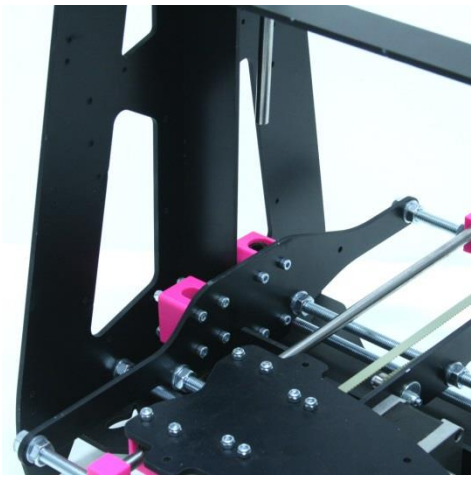
Assembly description:

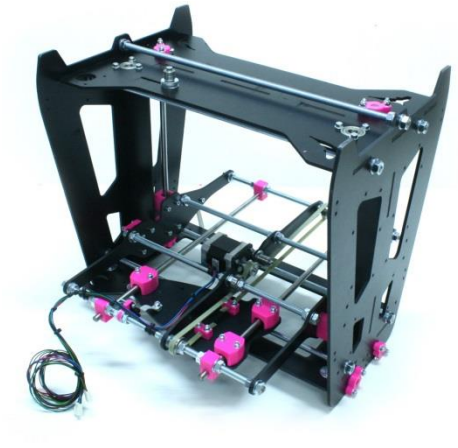
Step 01 - Preparation / collecting all parts

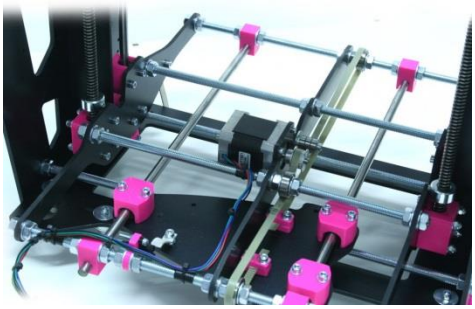


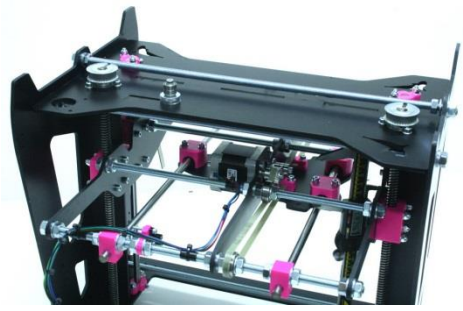
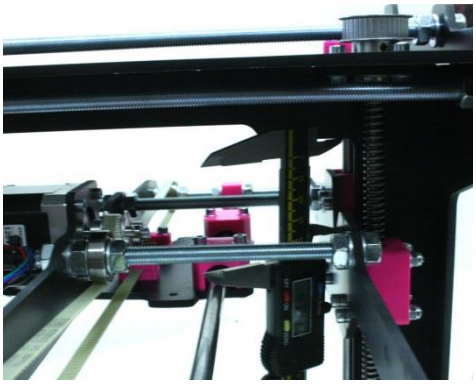
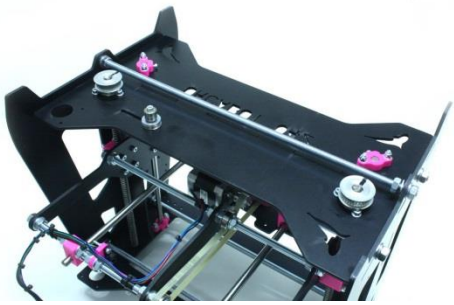
Step 02 - Preparation of ...

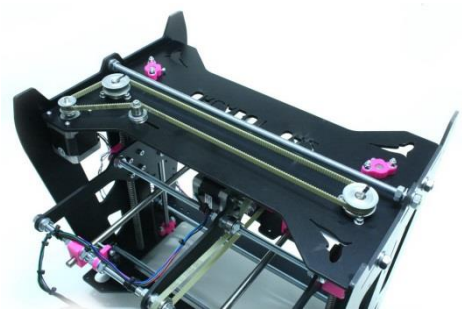


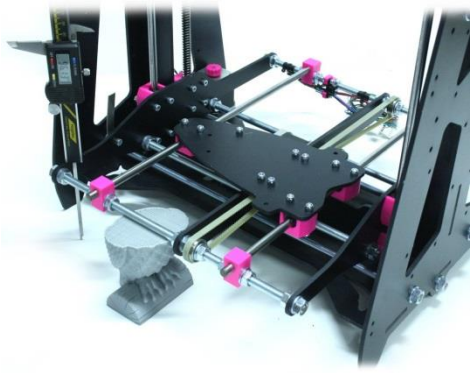


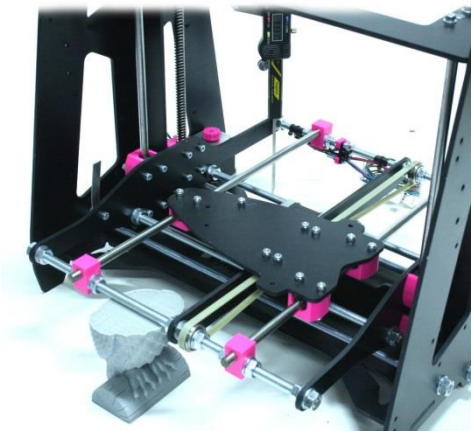


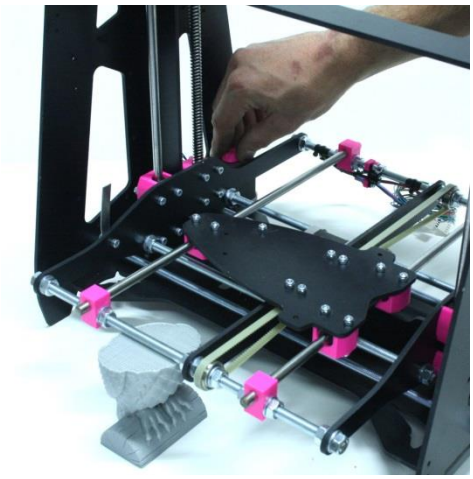


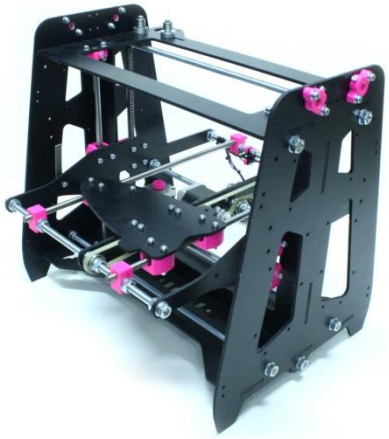














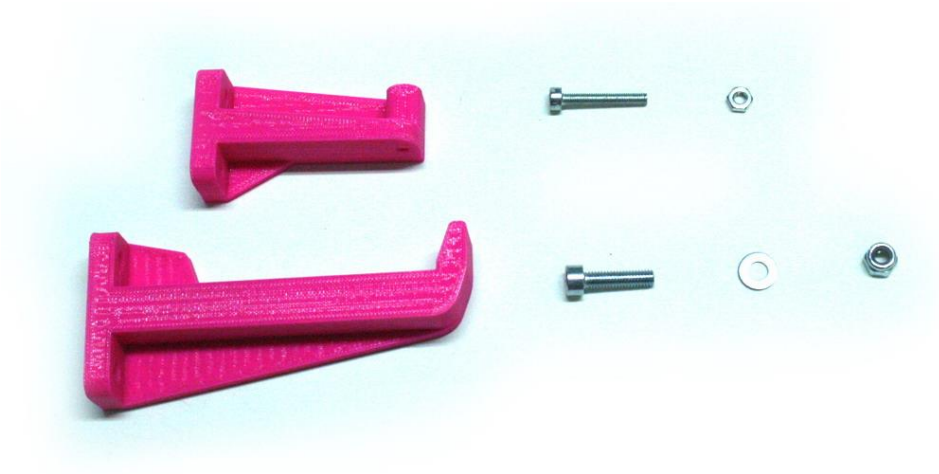
11. Fit external parts and processor board

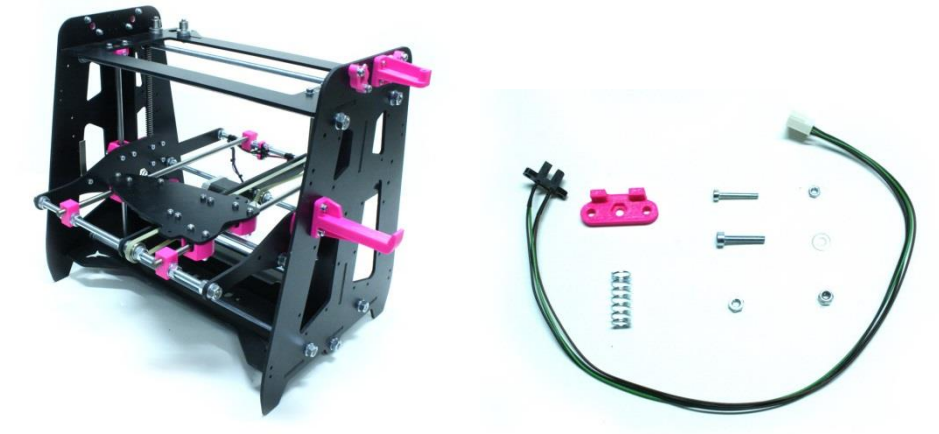
Parts list:

QTY Description

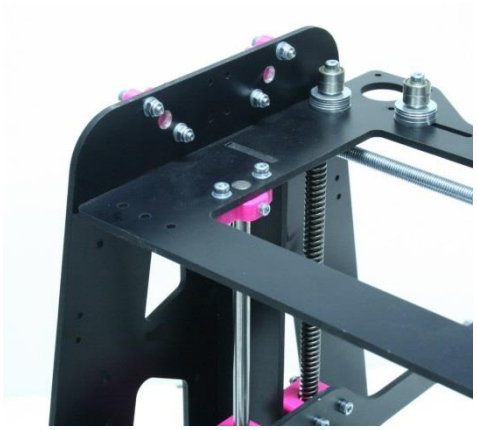
Assembly description:

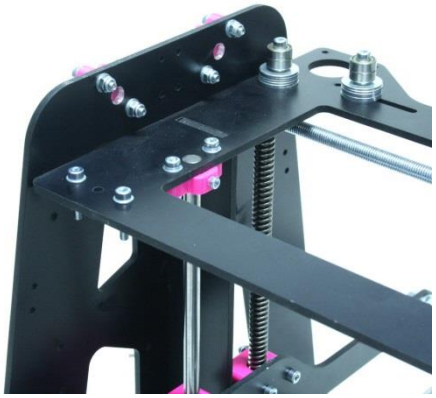
Step 01 - Preparation / collecting all parts

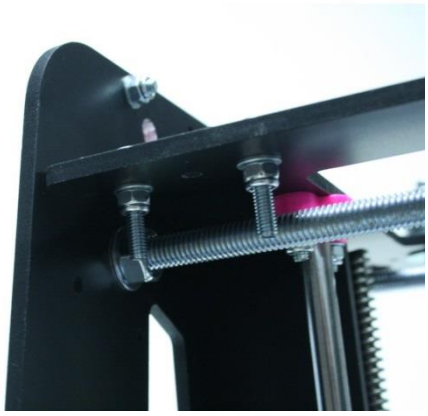


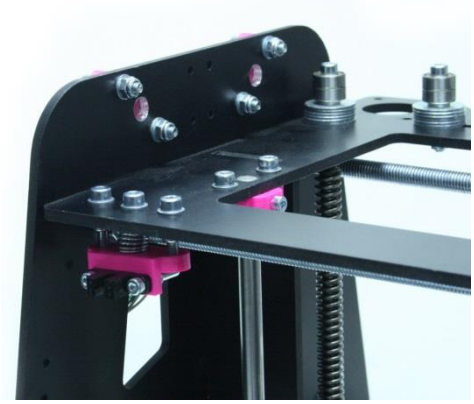


Step 02 - Preparation / collecting all parts

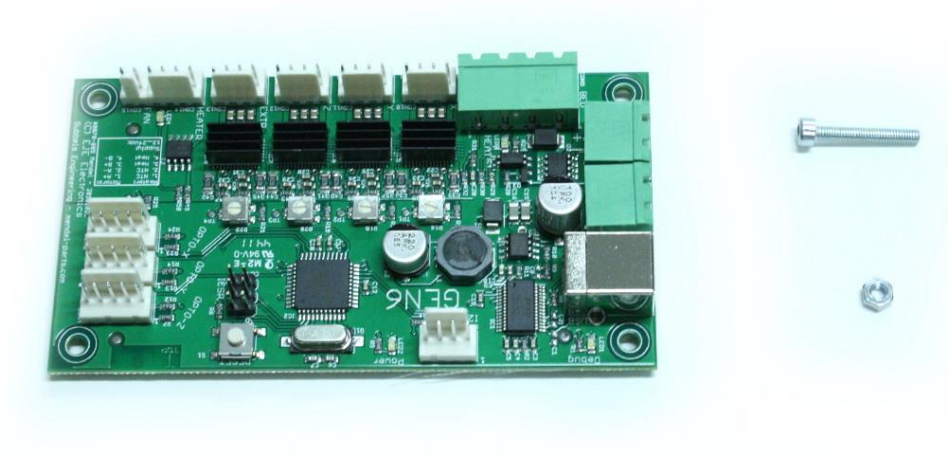


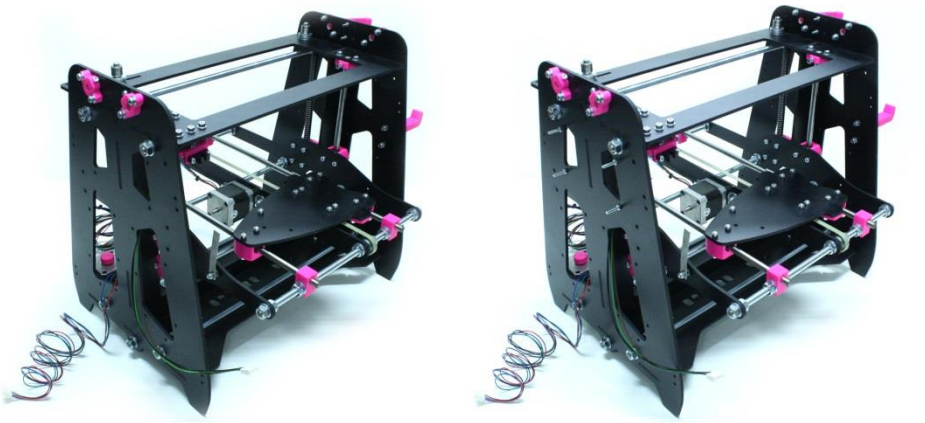


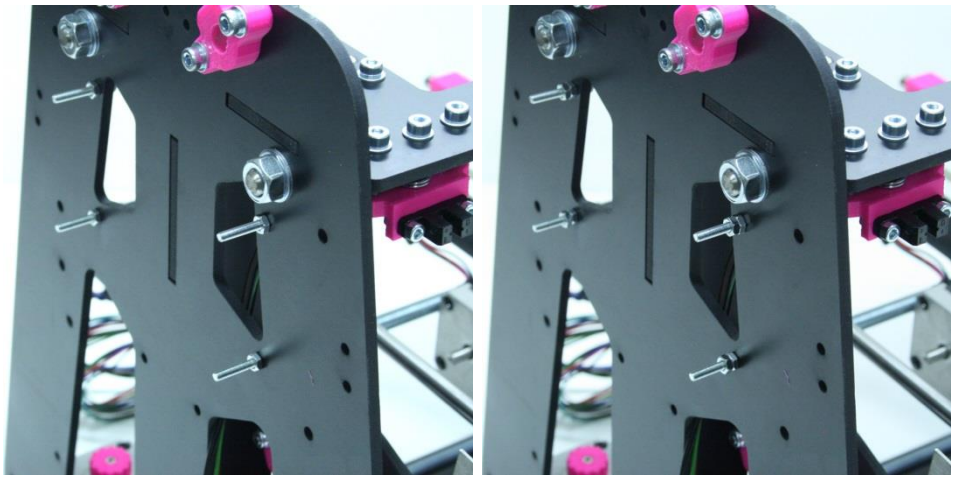


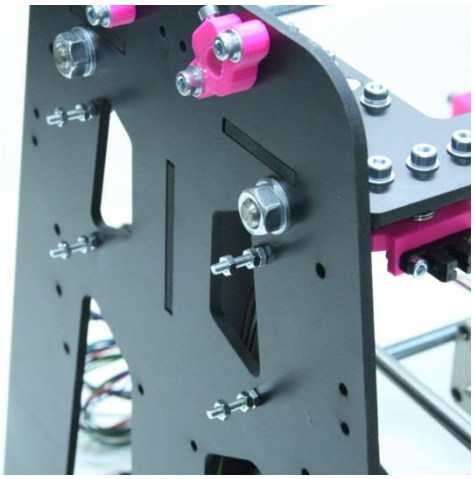


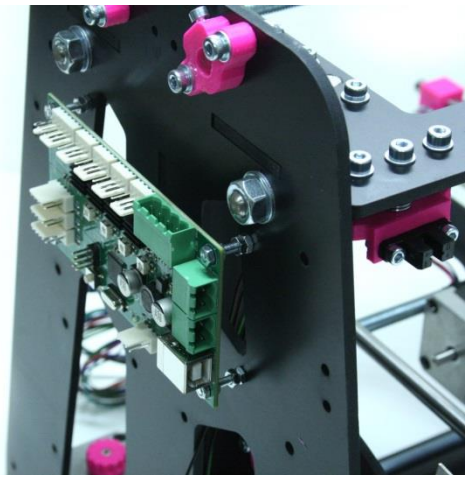
Step 03 – Mounting processor board

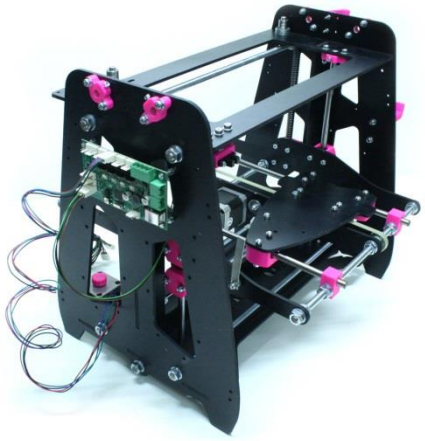












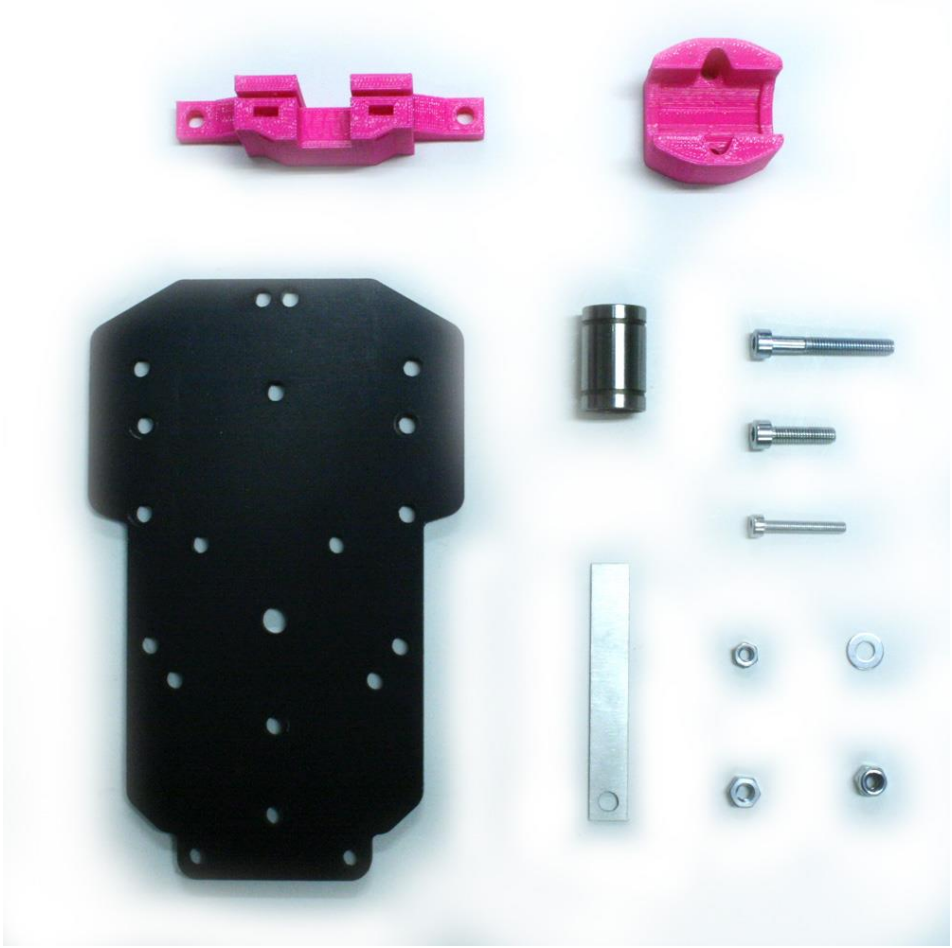
12. Y-carriage pre-assebly

Parts list:

QTY Description

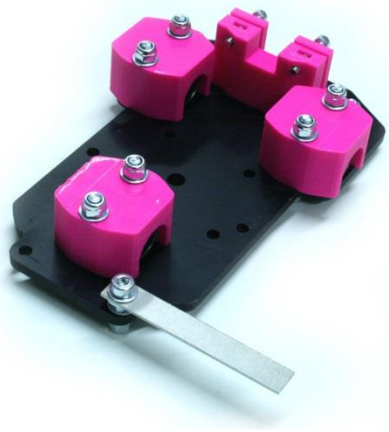
Assembly description:

Step 01 - Preparation / collecting all parts



Step 02 - Preparation

Step 03 - Assemble



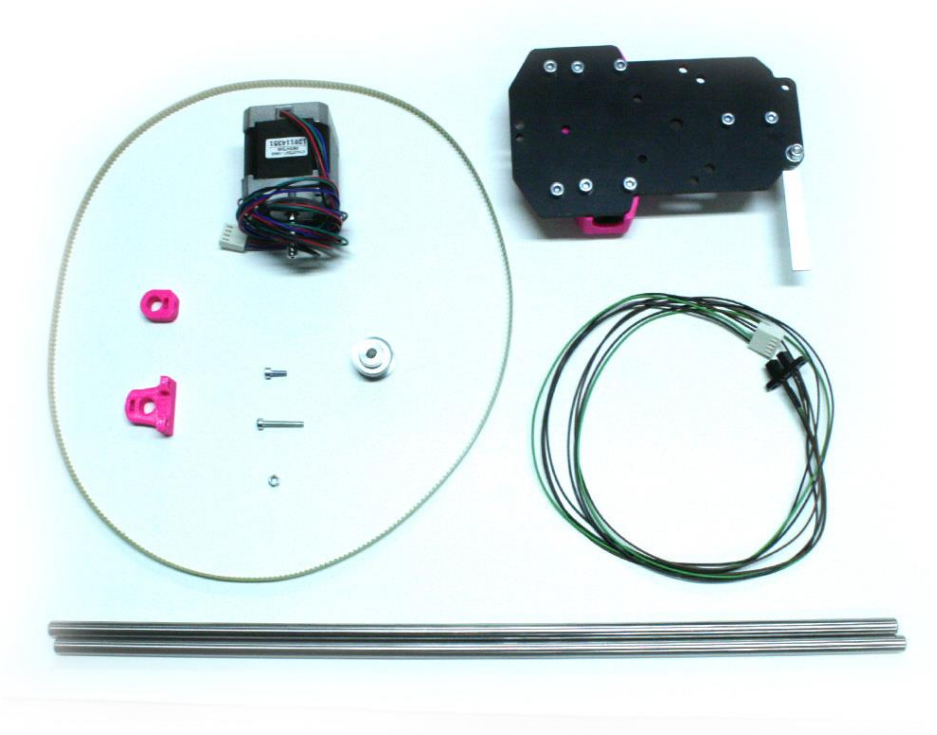
13. Fit X-carriage

Parts list:

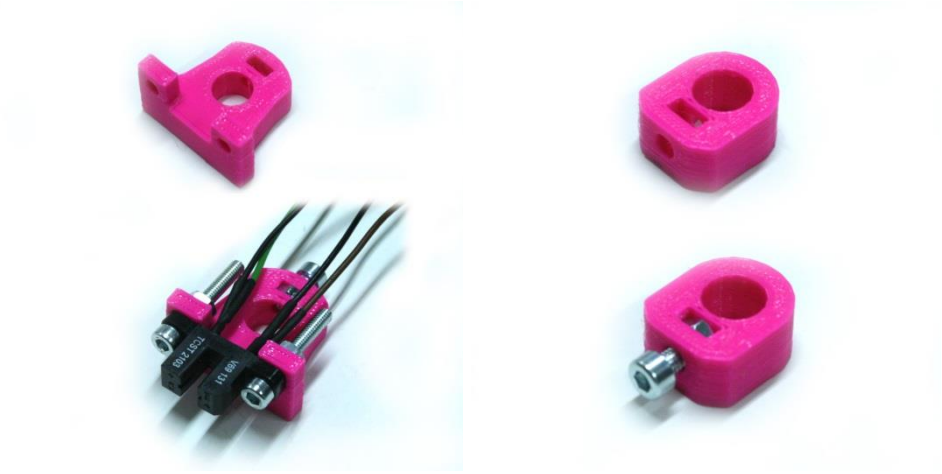
QTY	Description

Assembly description:

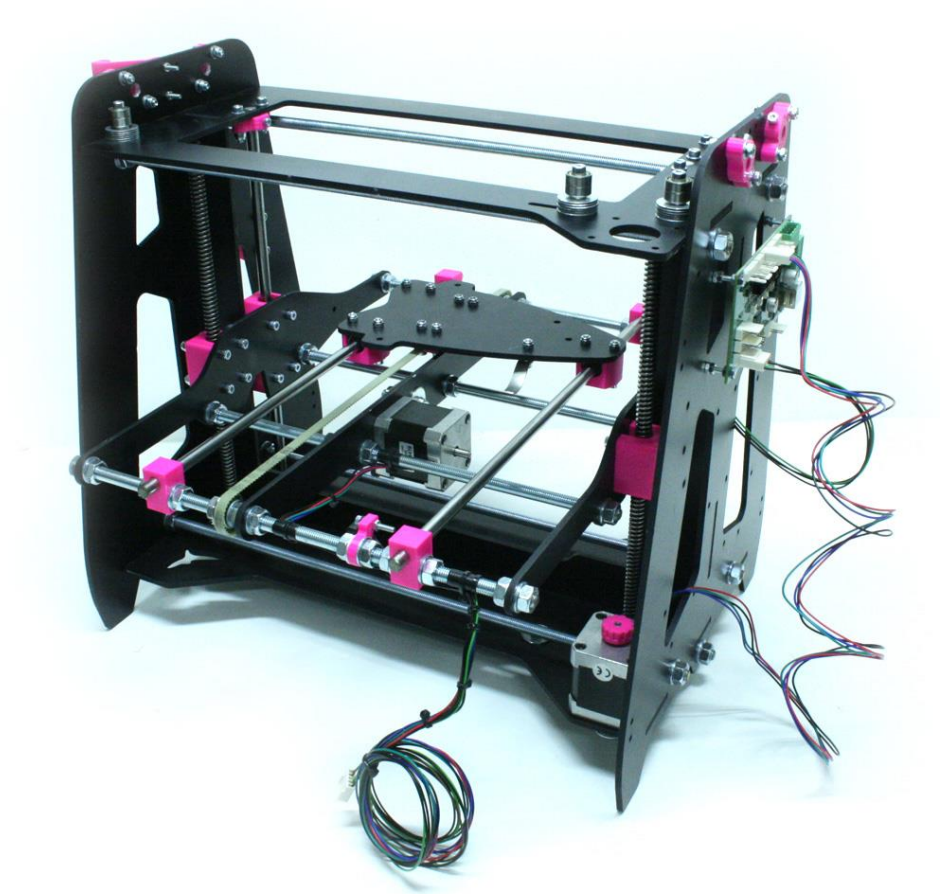
Step 01 - Preparation / collecting all parts

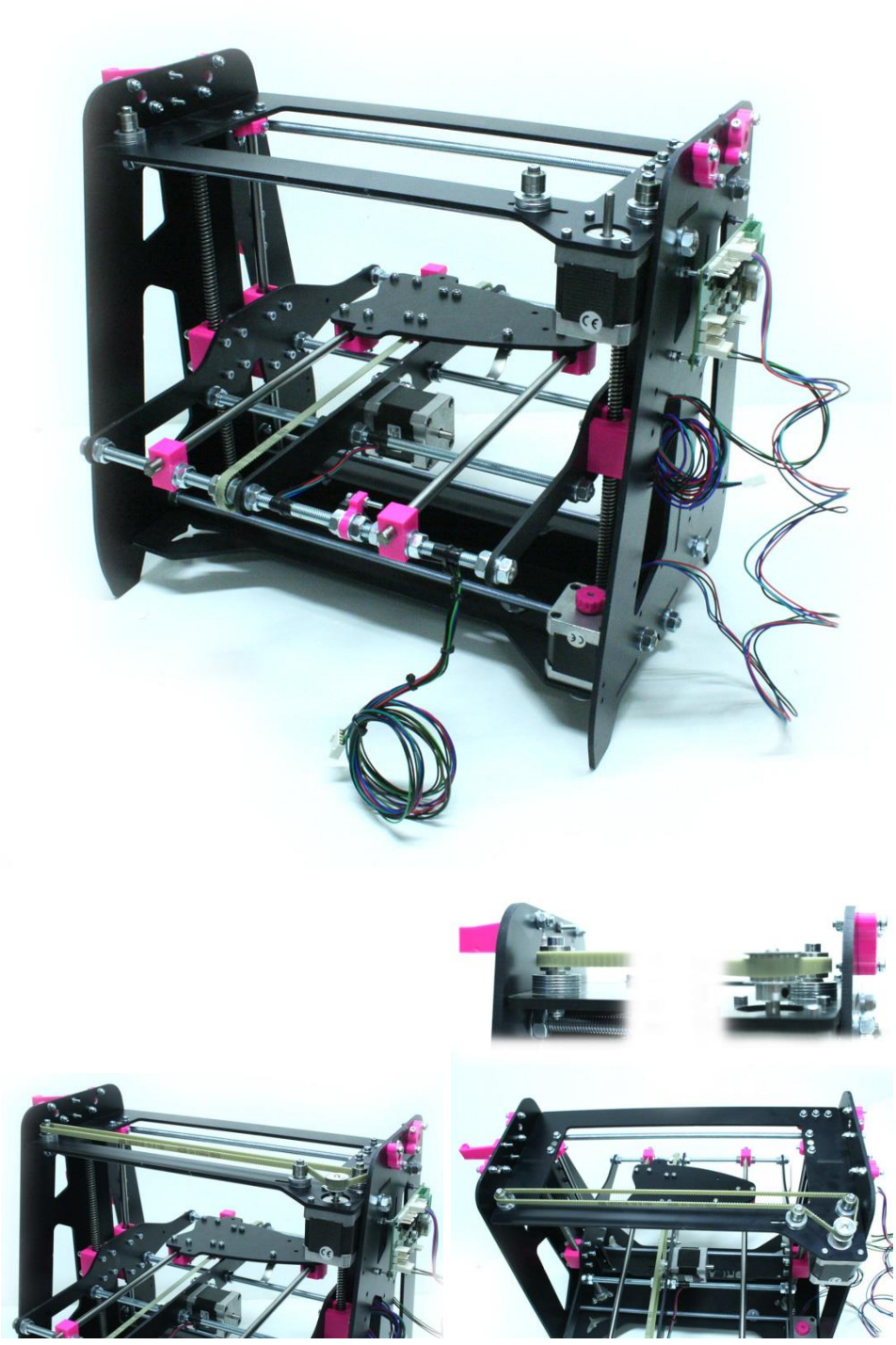


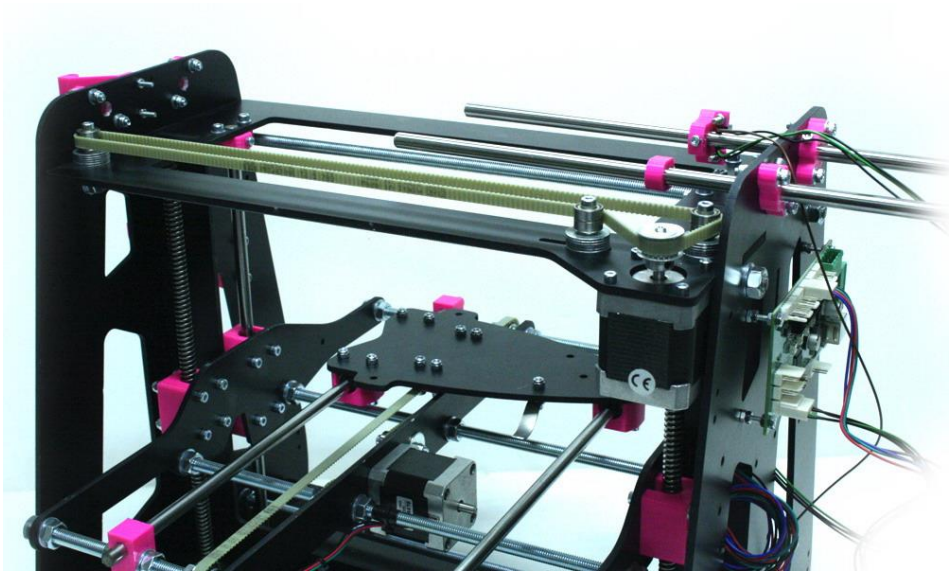
Step 02 - Preparation

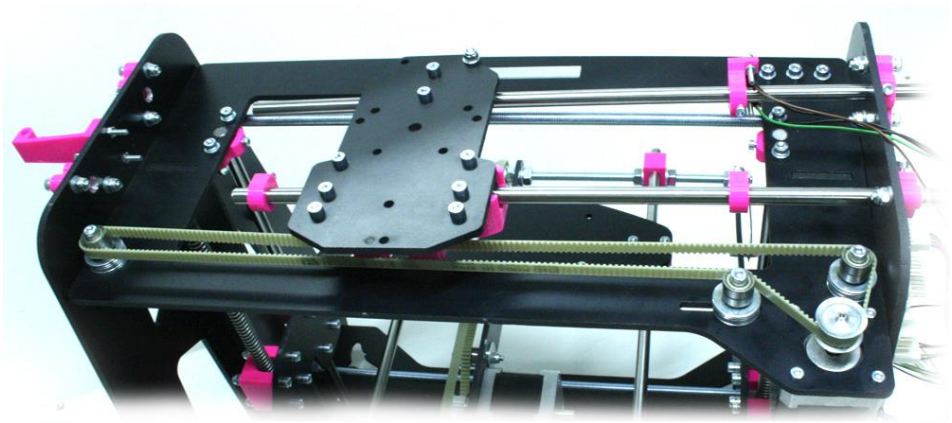


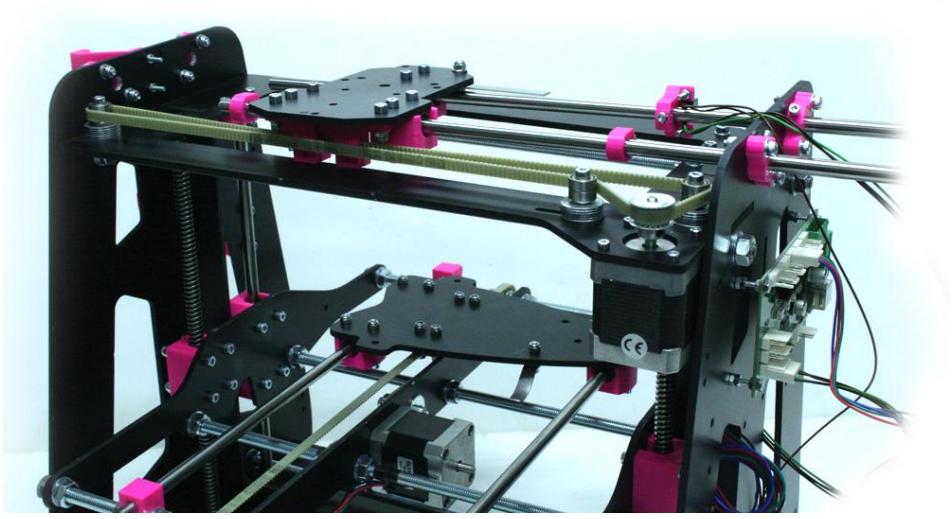
Step 03 - Assemble

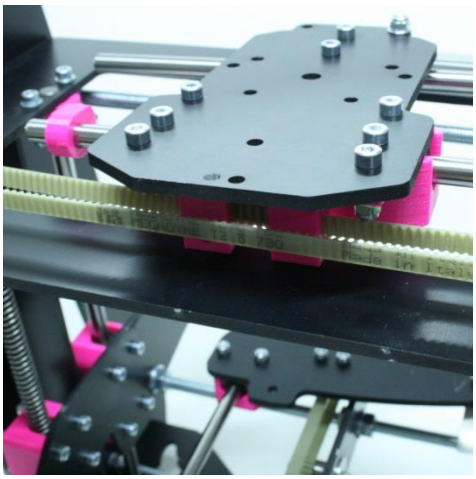


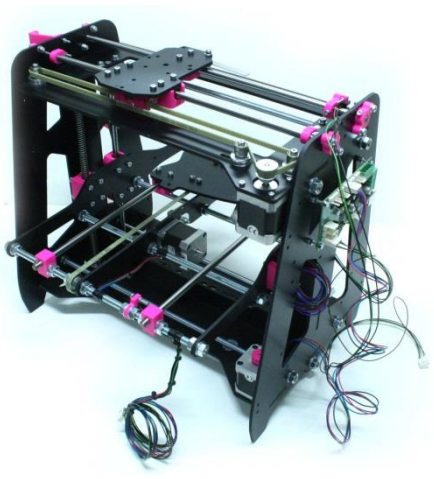












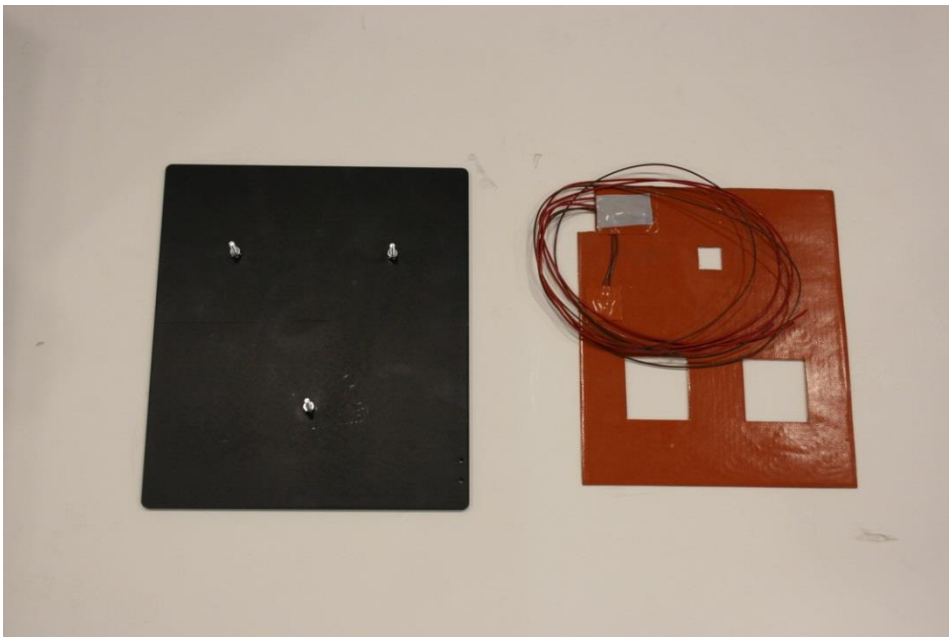
14. Printbed pre-assembly

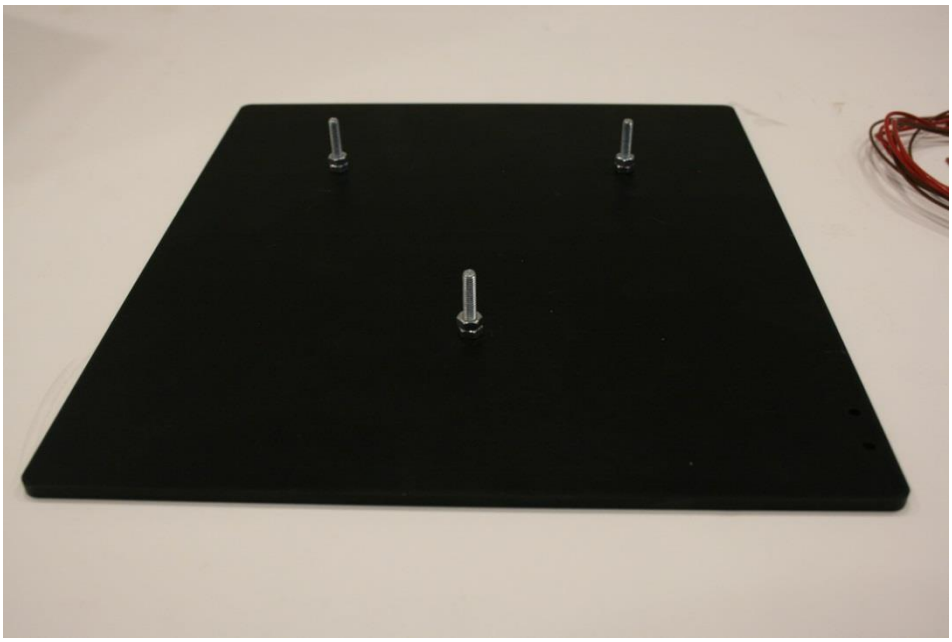
Parts list:

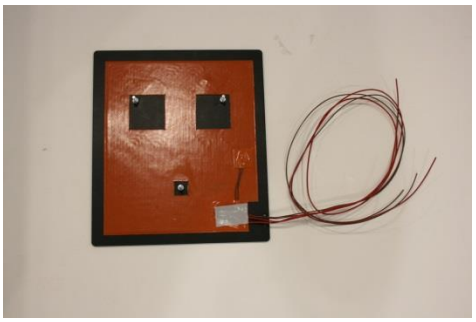
QTY Description

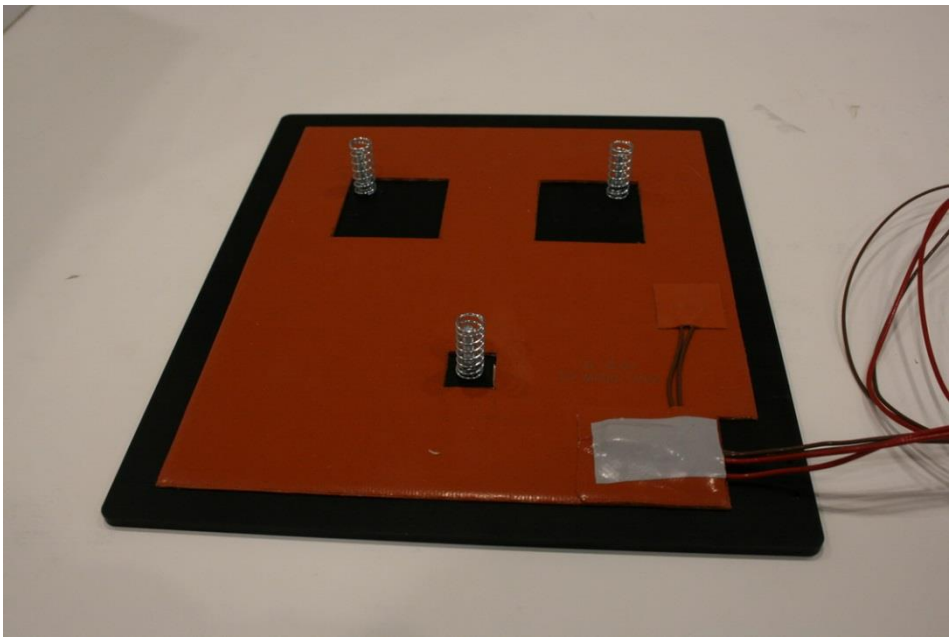
Assembly description:

Step 01 - Preparation / collecting all parts









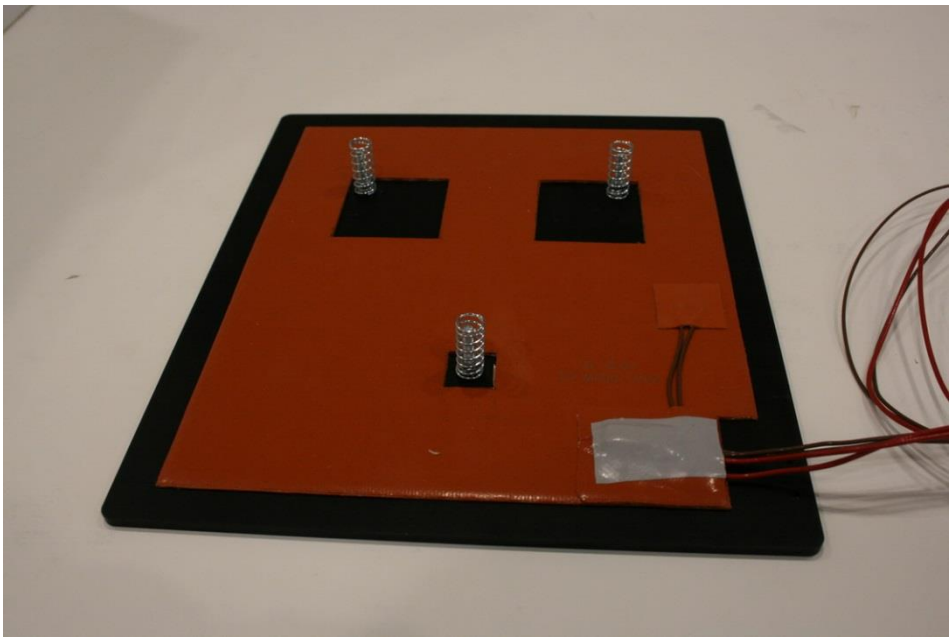
15. Fit printbed

Parts list:

QTY	Description

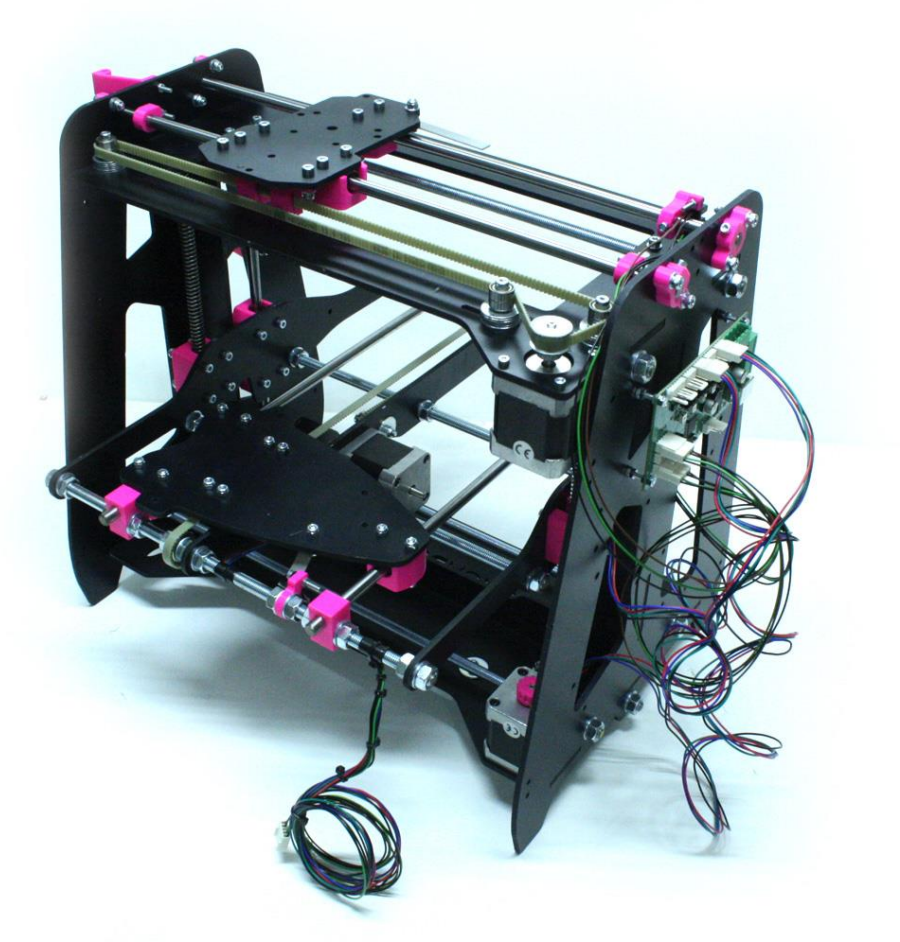
Assembly description:

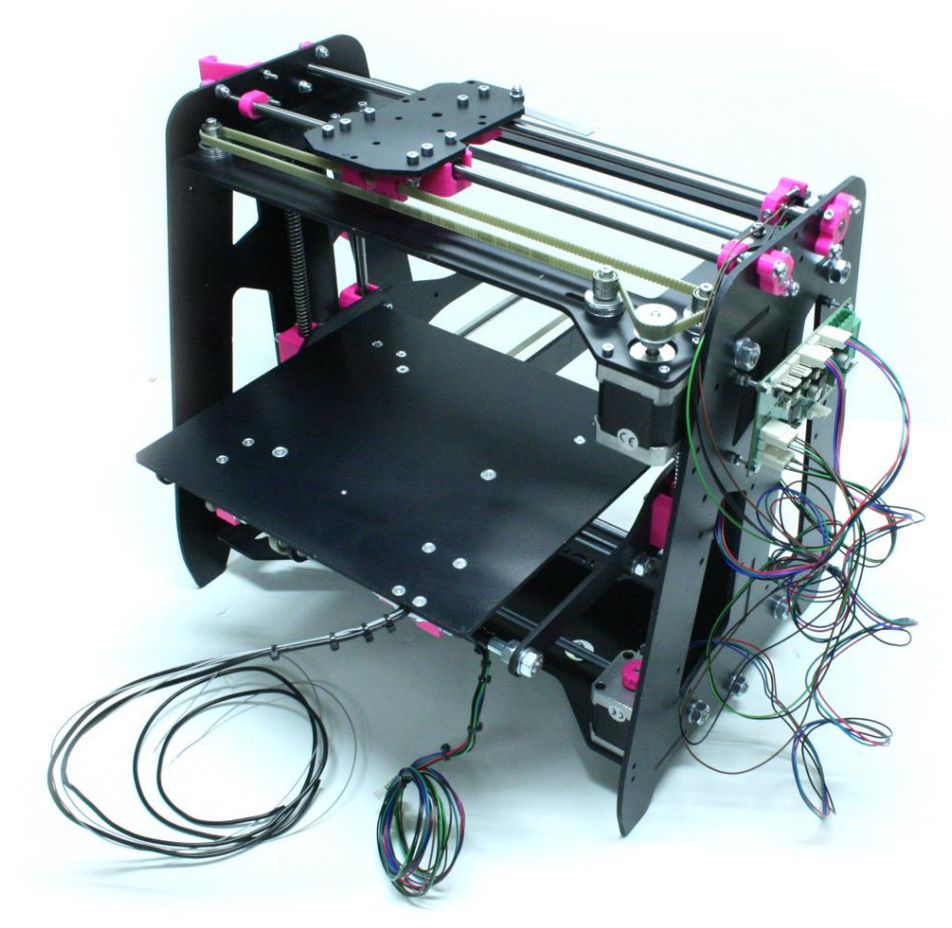
Step 01 - Preparation / collecting all parts

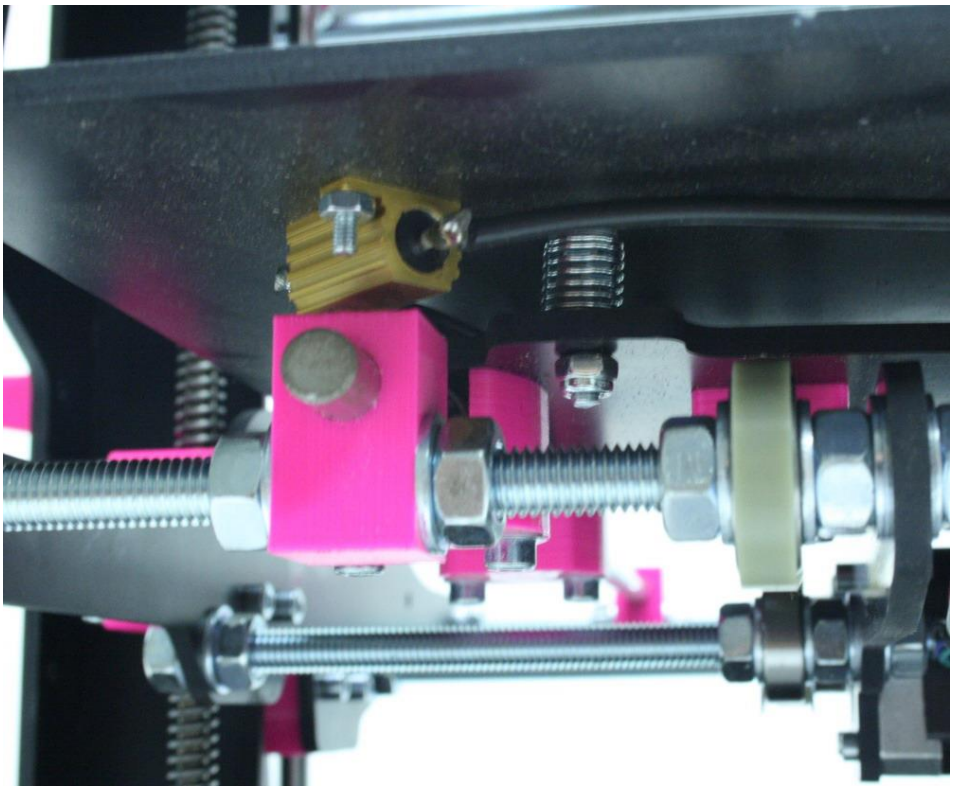


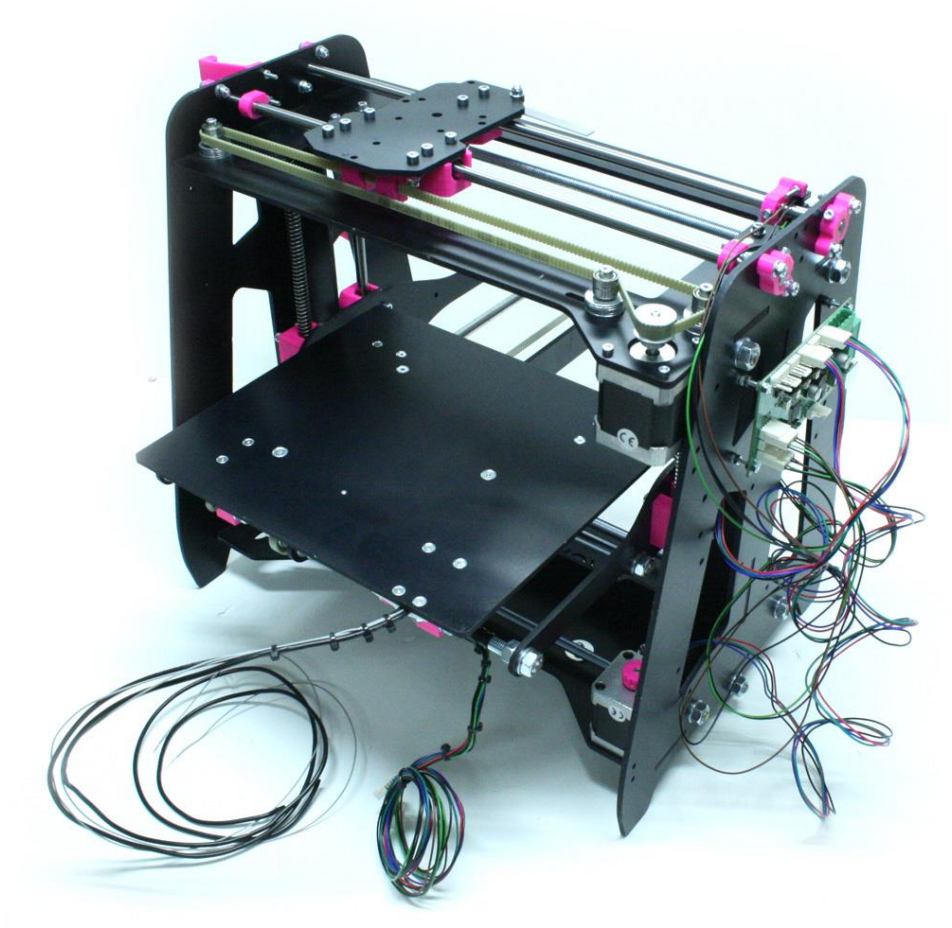
02 - Preparation of

03 - Assemble









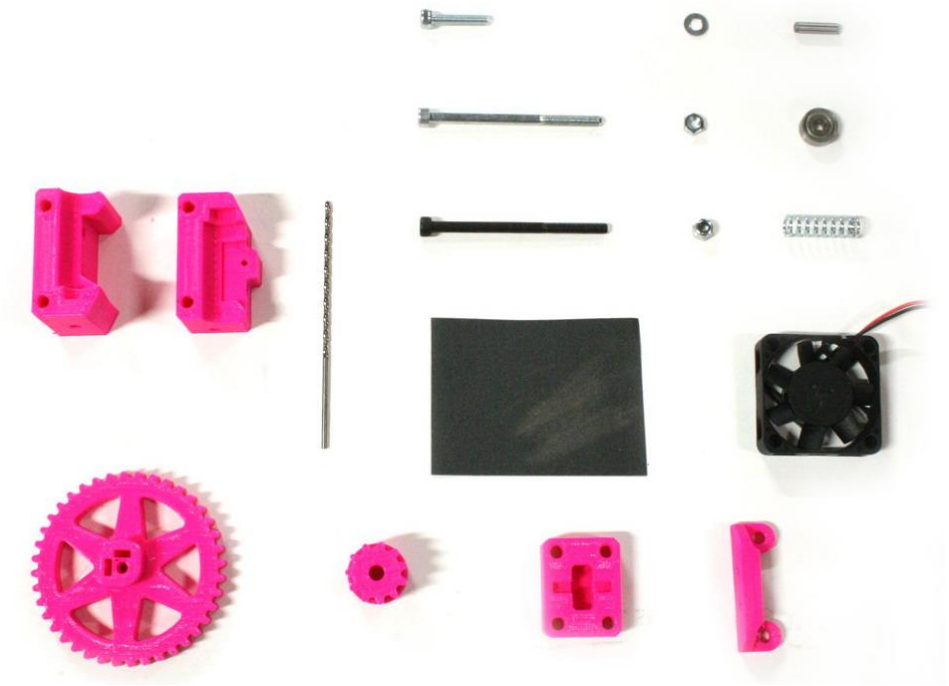
16. Extruder pre-assembly

Parts list:

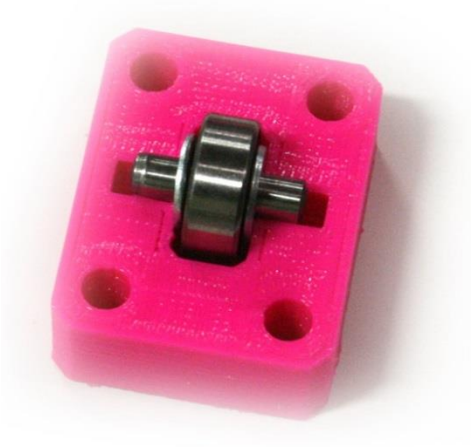
QTY Description

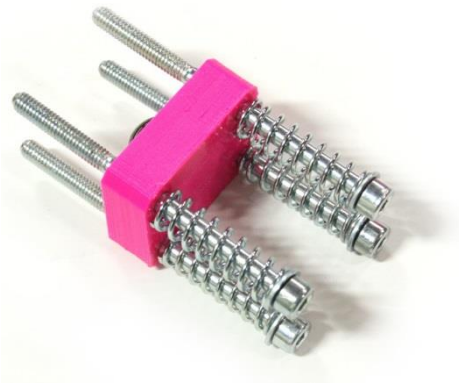
Assembly description:

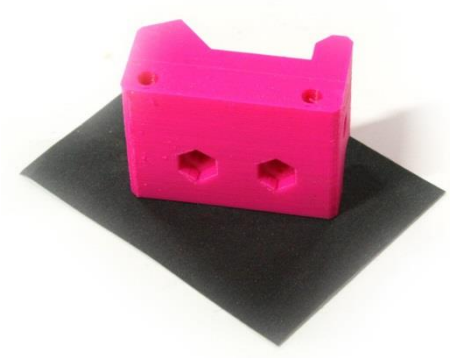
Step 01 - Preparation / collecting all parts

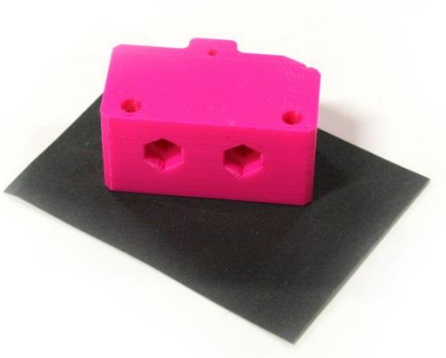


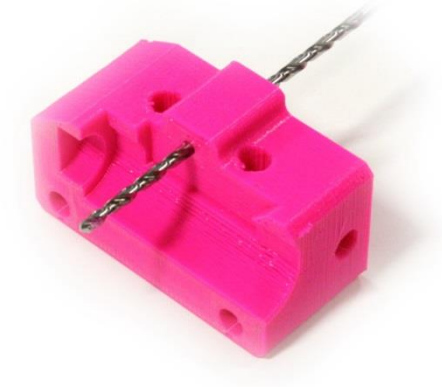
02 - Preparation of

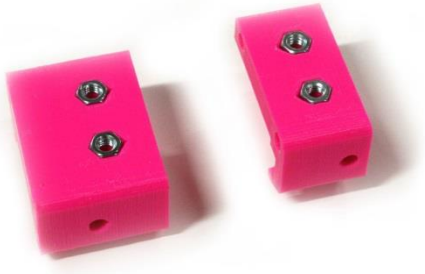




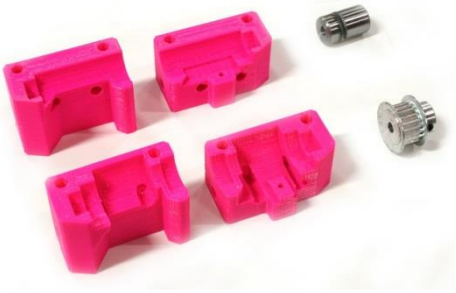


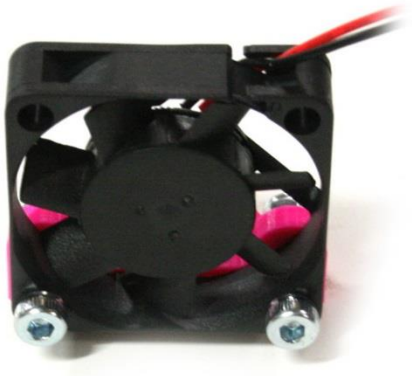




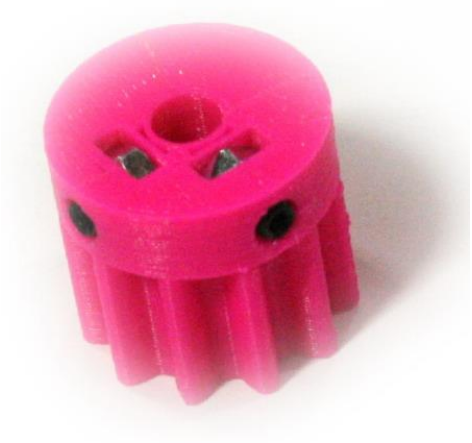


This picture shows the difference between v10 / v10B plastic parts and the pulley / hobbed shaft:





03 - Assemble



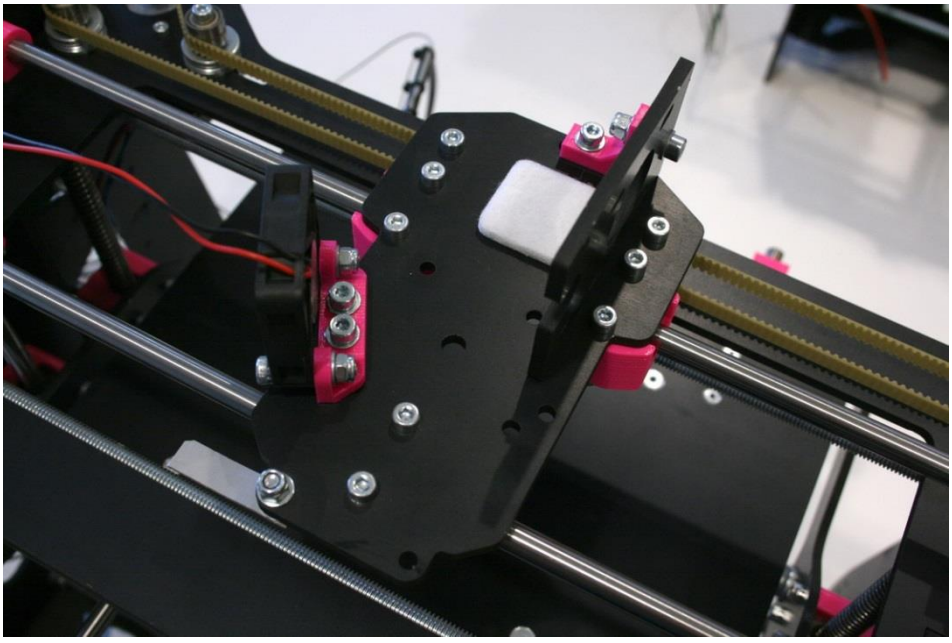
17. Fitting extruder and hotend

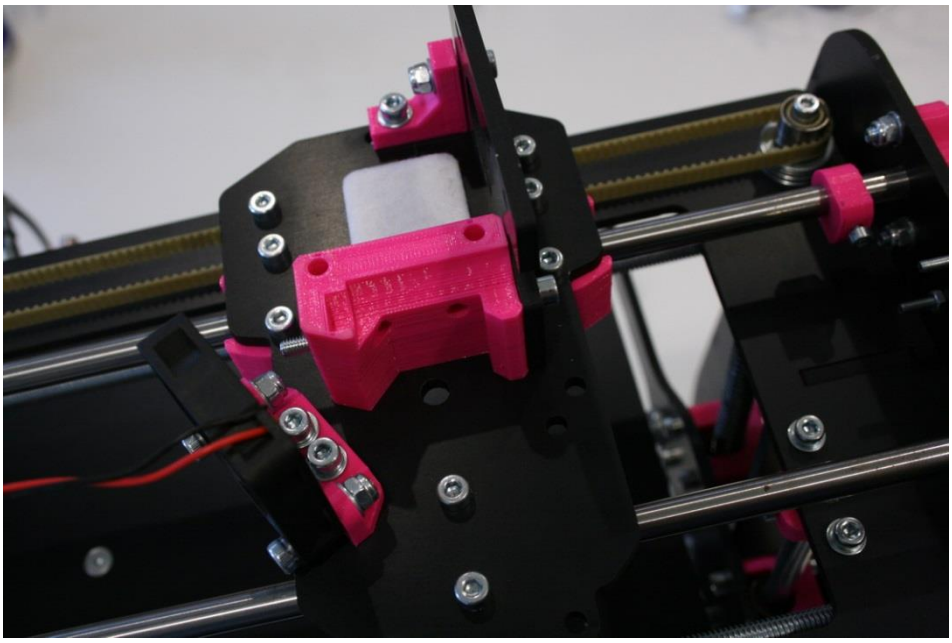
Parts list:

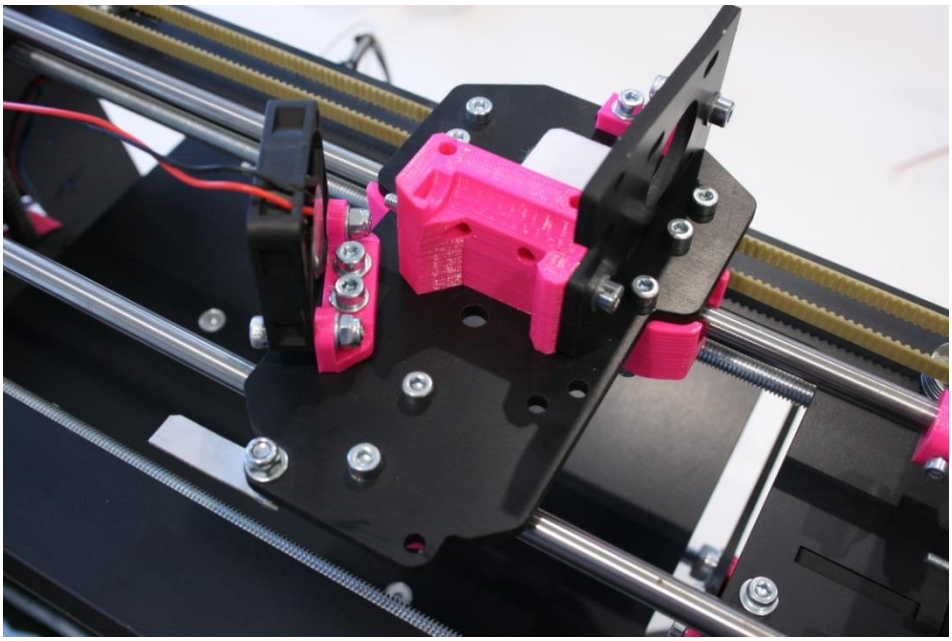
QTY Description

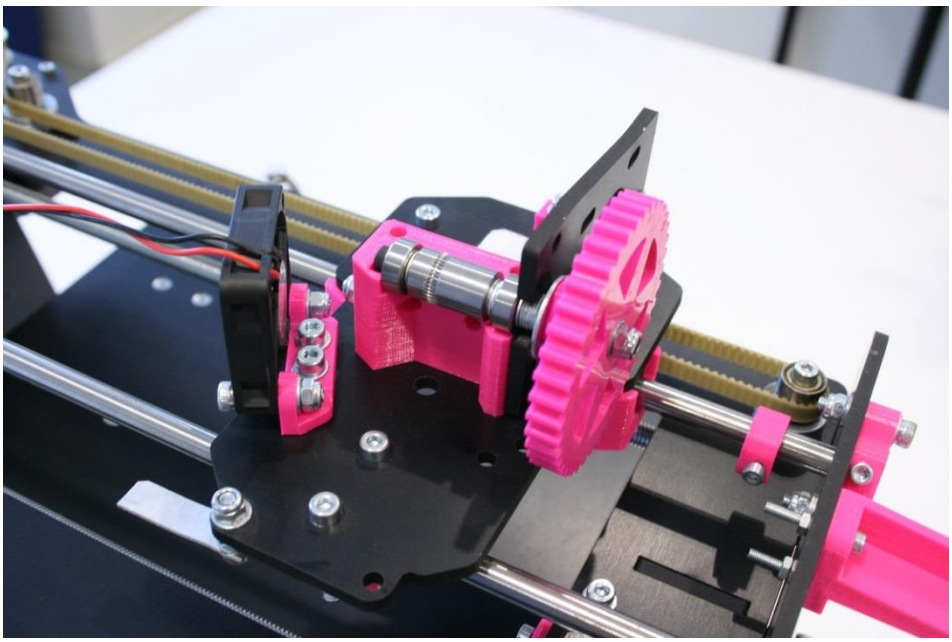
Assembly description:

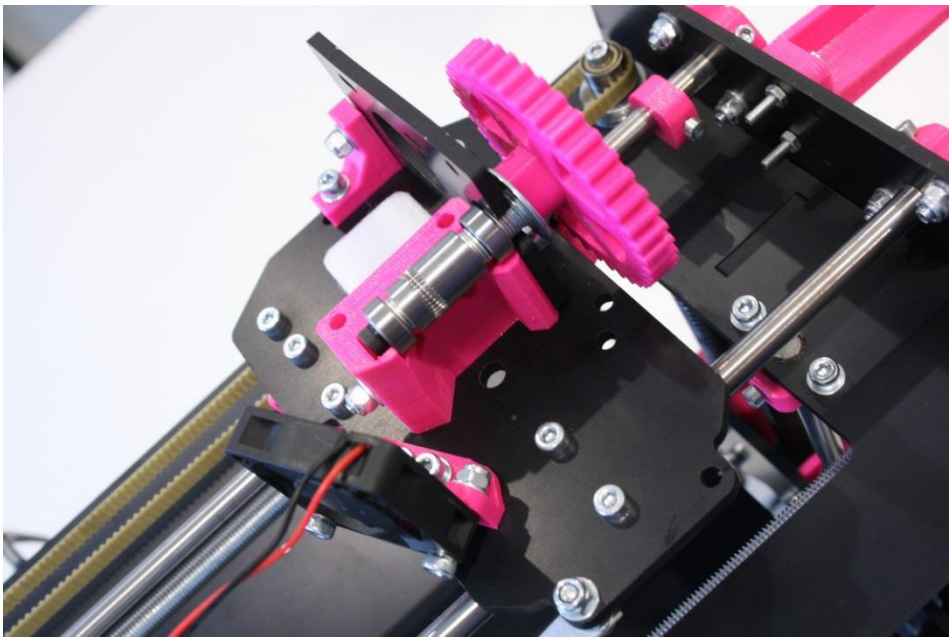
Step 01 - Preparation / collecting all parts

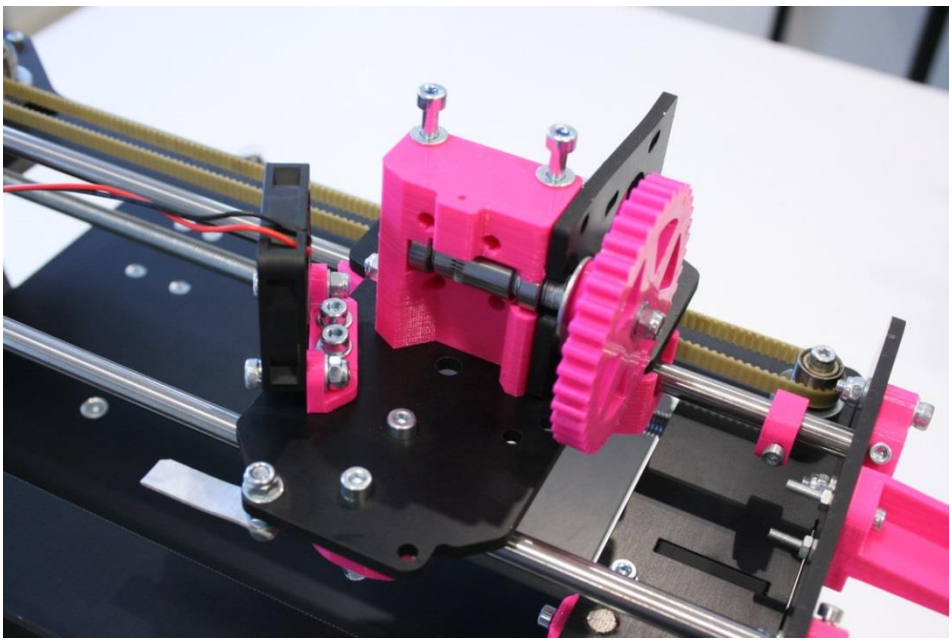


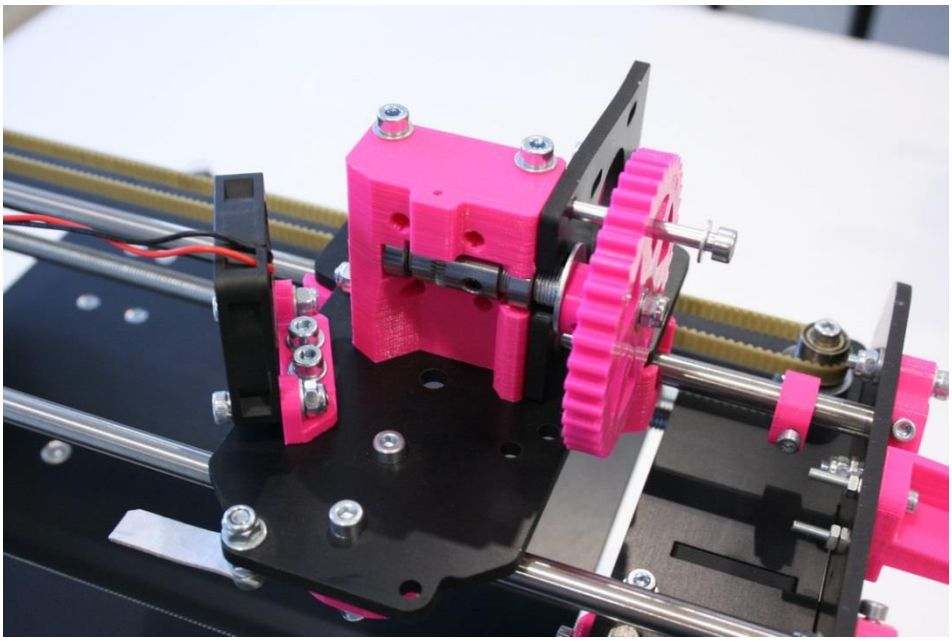


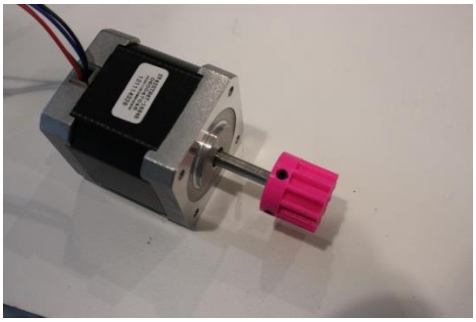


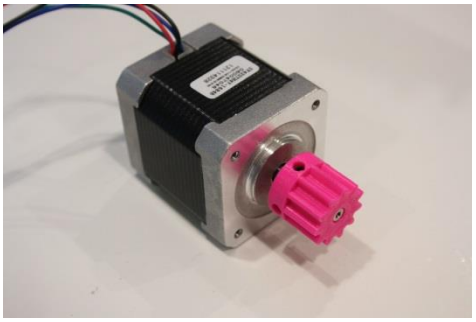


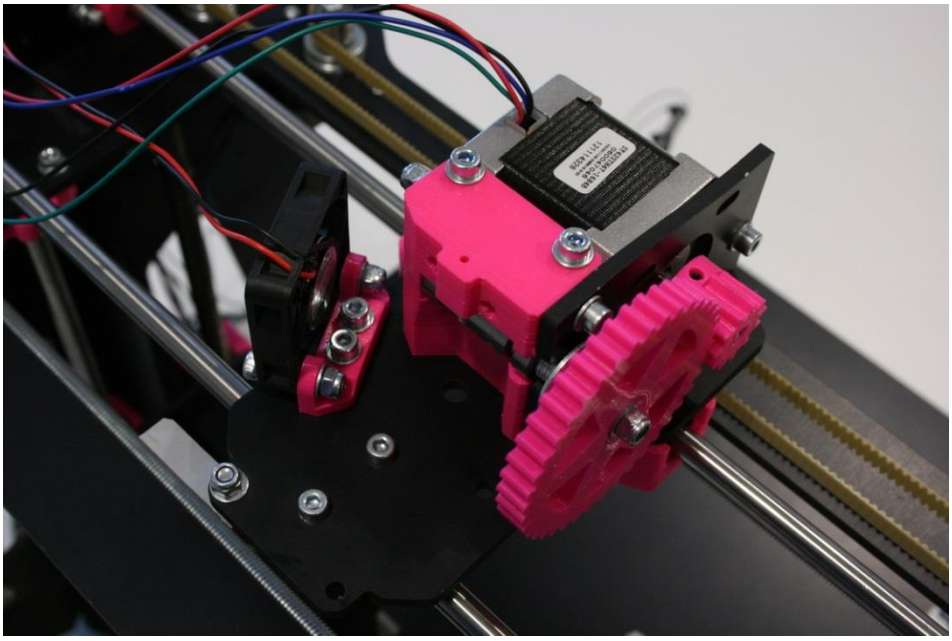


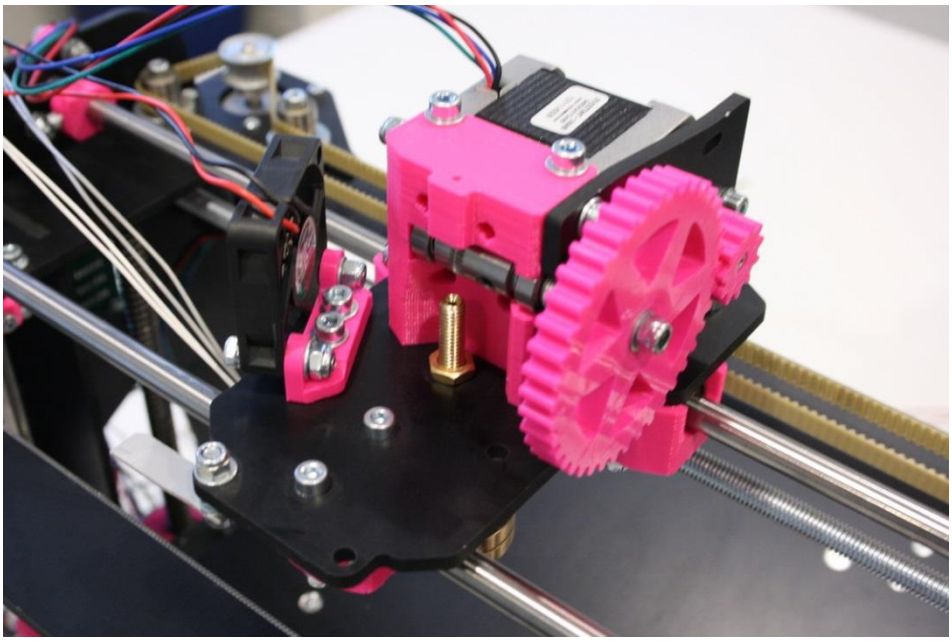


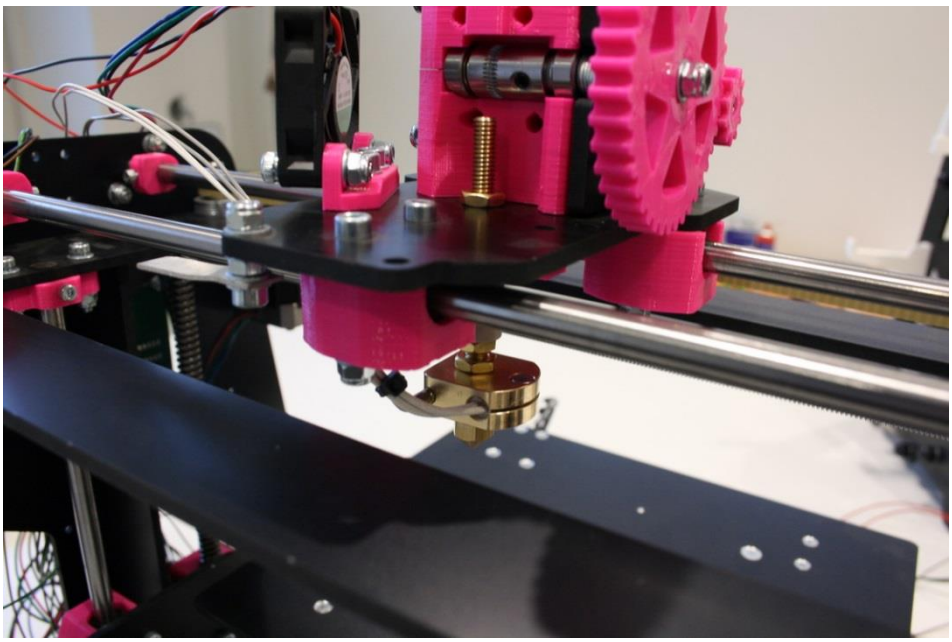


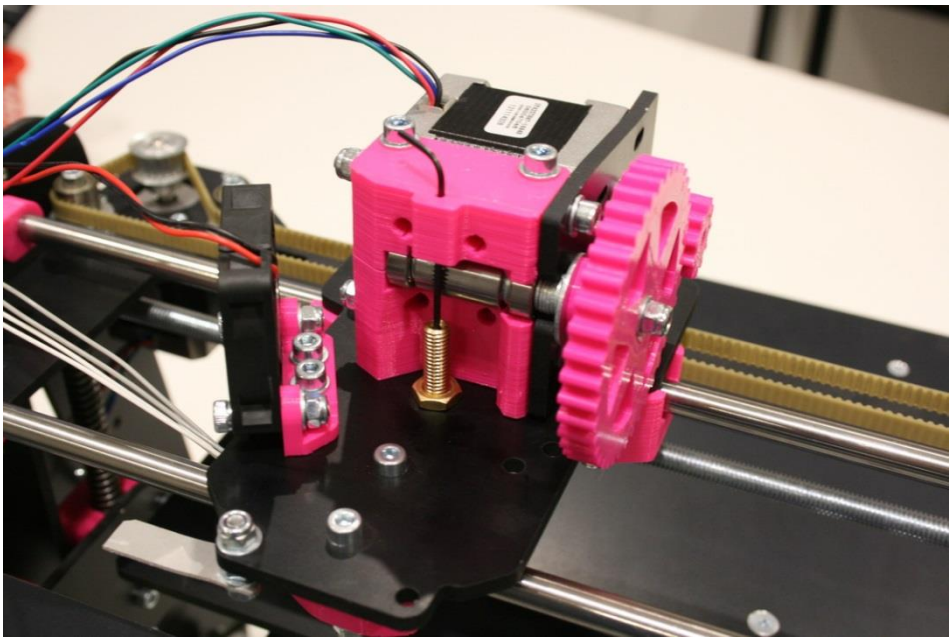


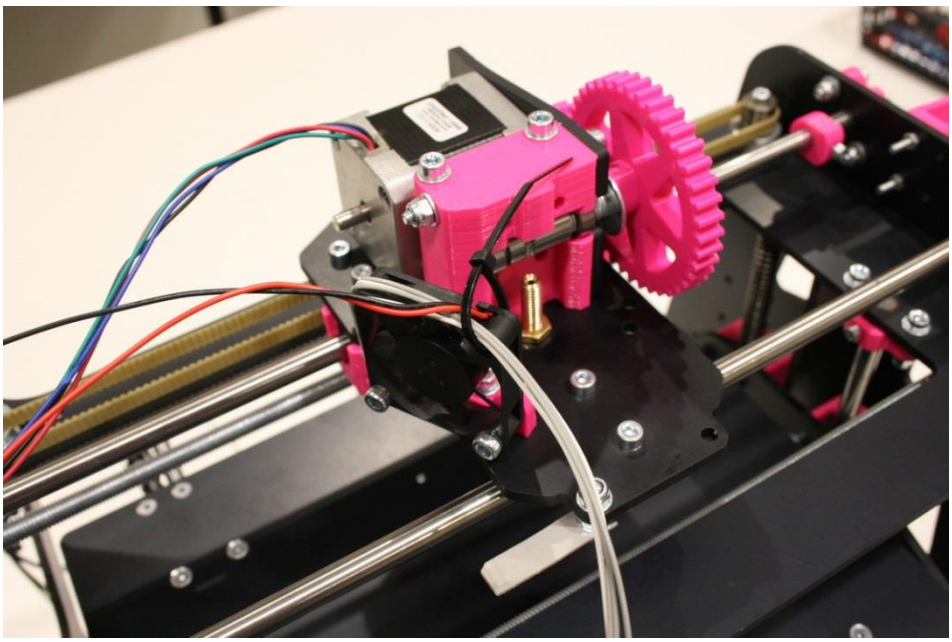


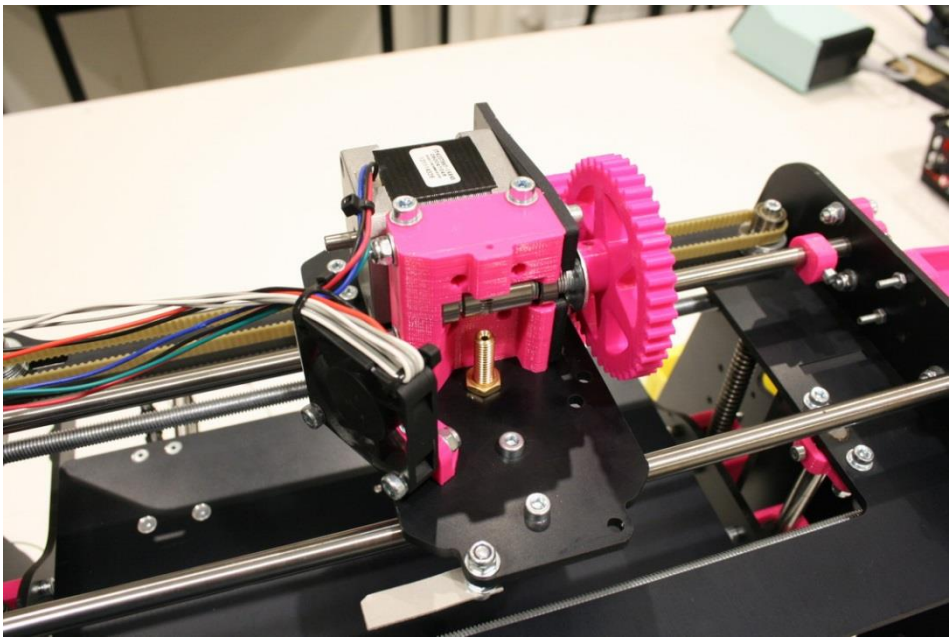


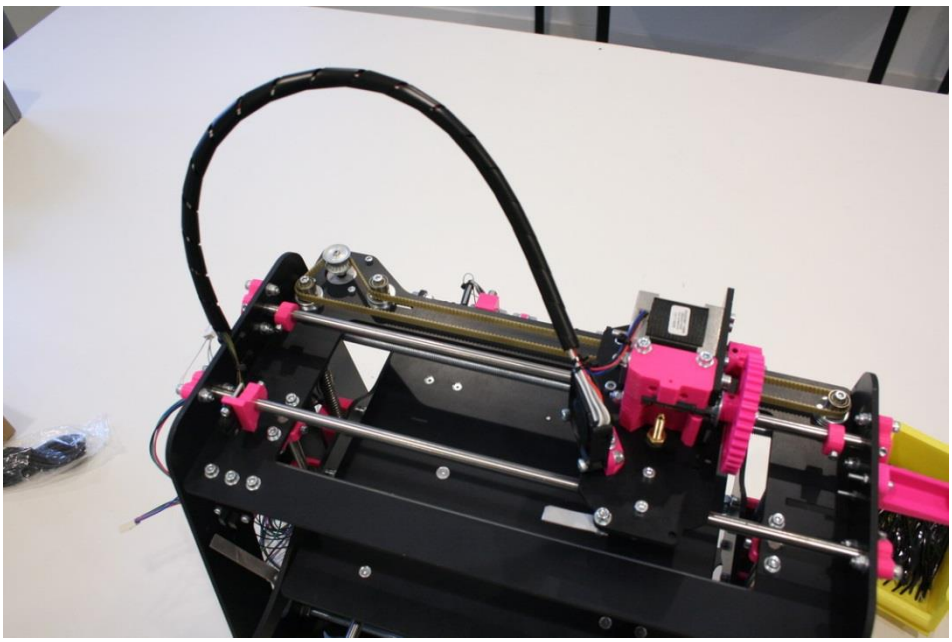


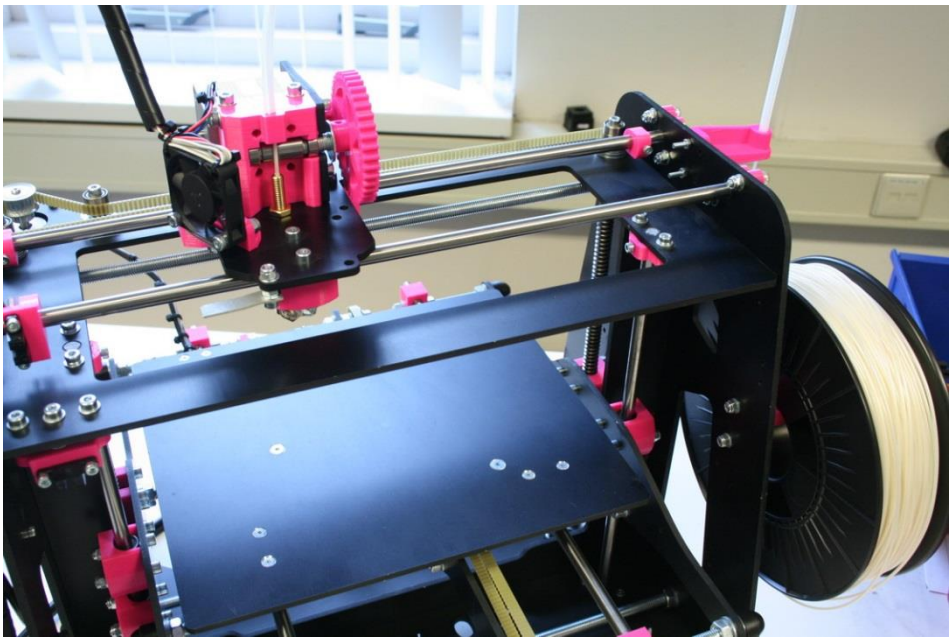


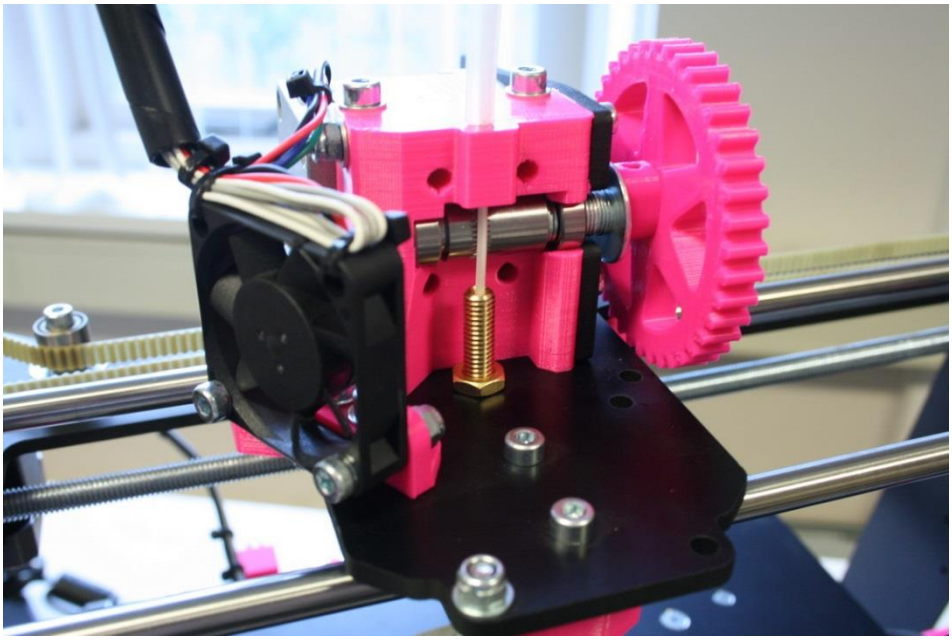


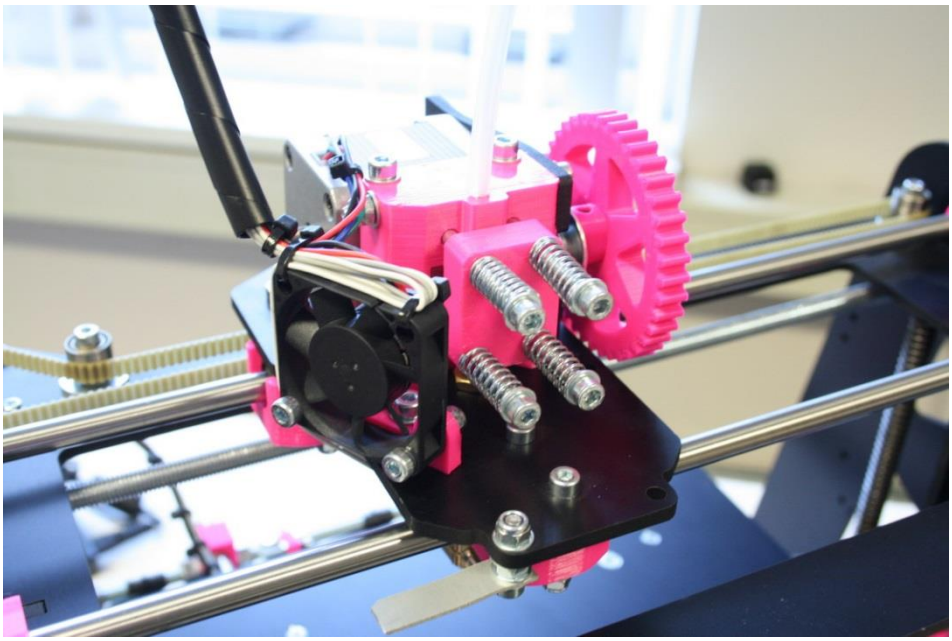


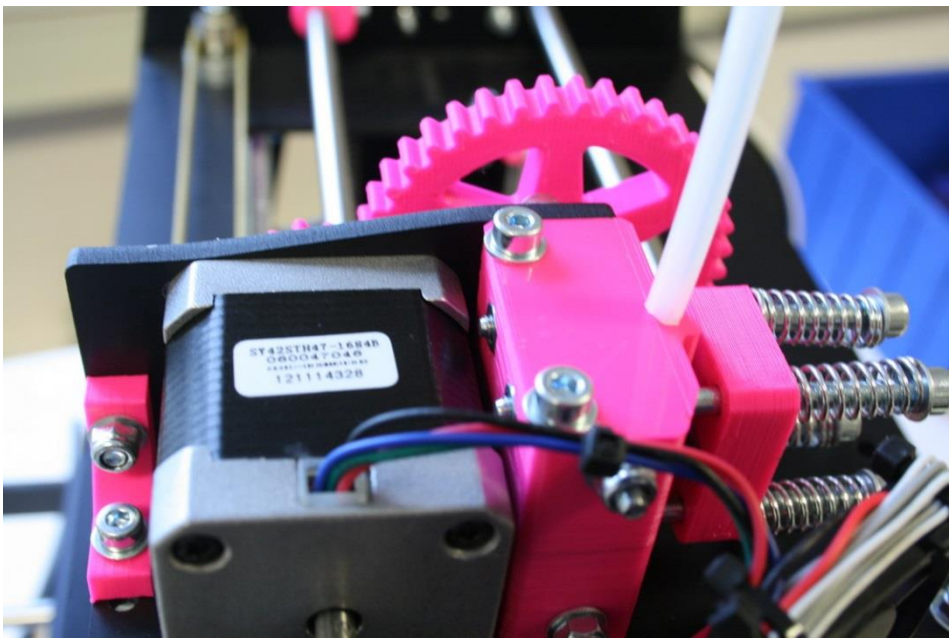






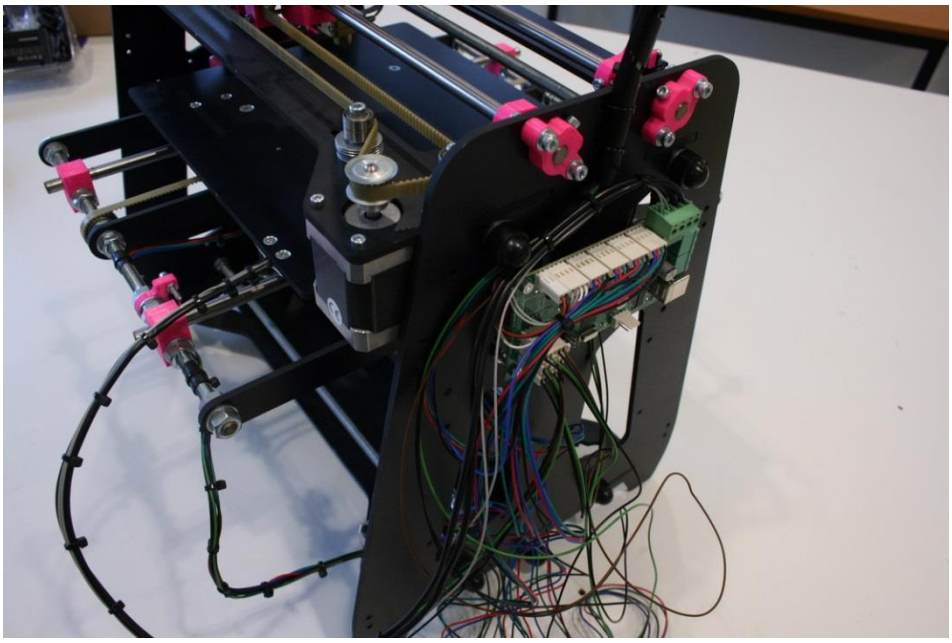


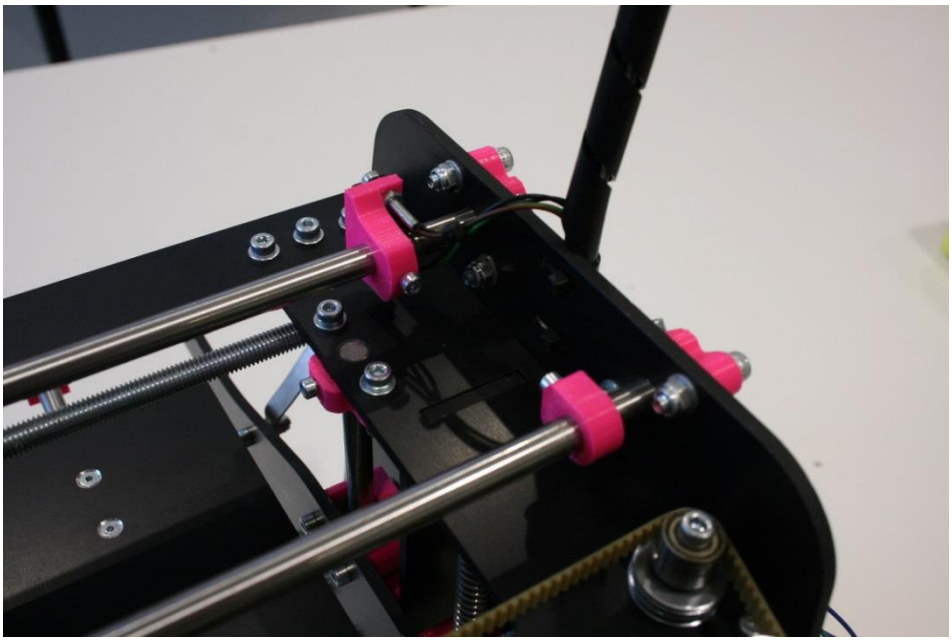


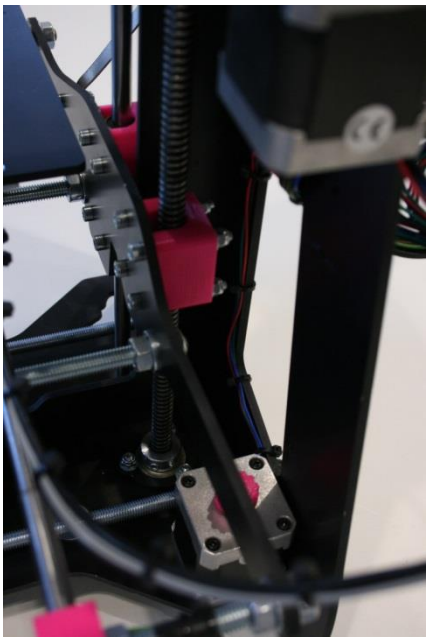


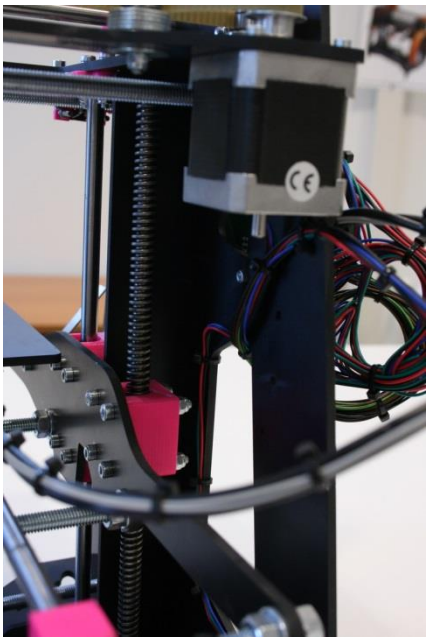
18. Cabling and connecting electronics

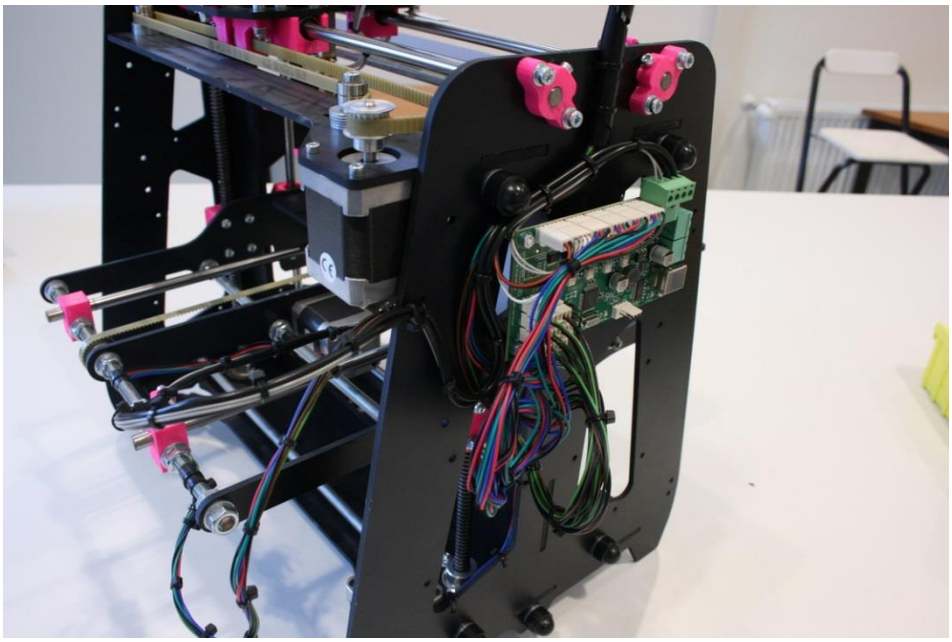
Assembly description:

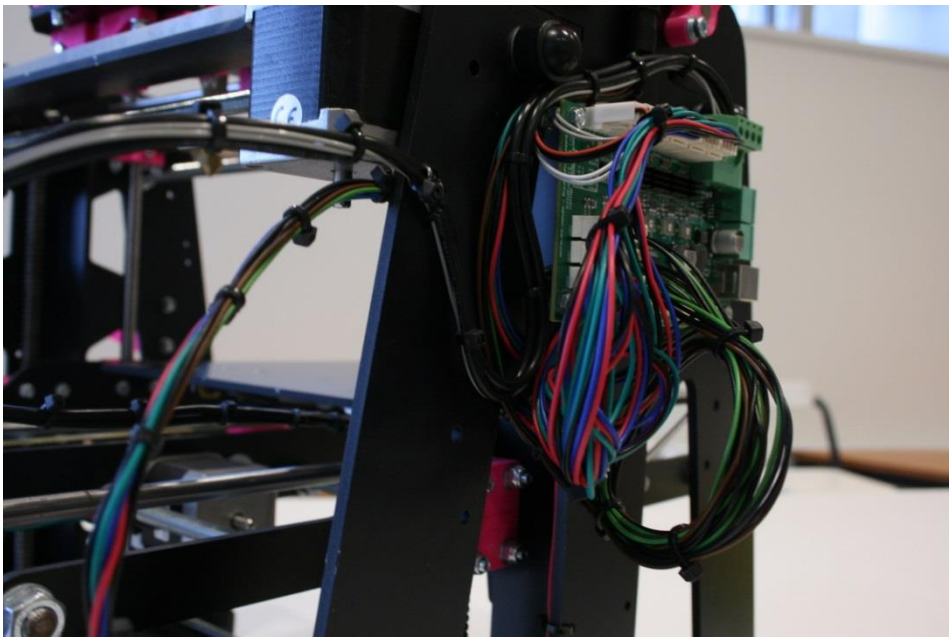


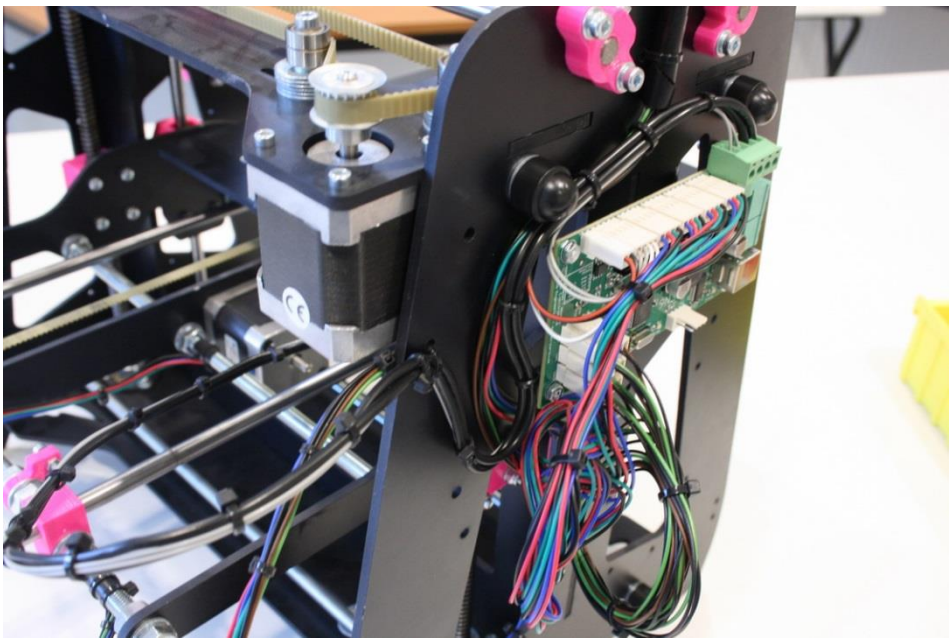


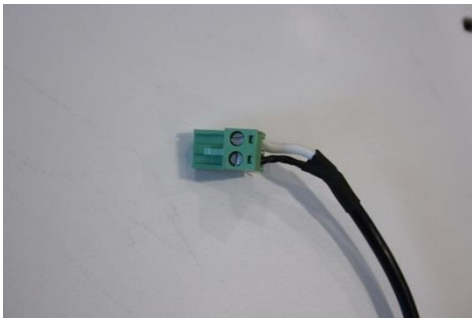






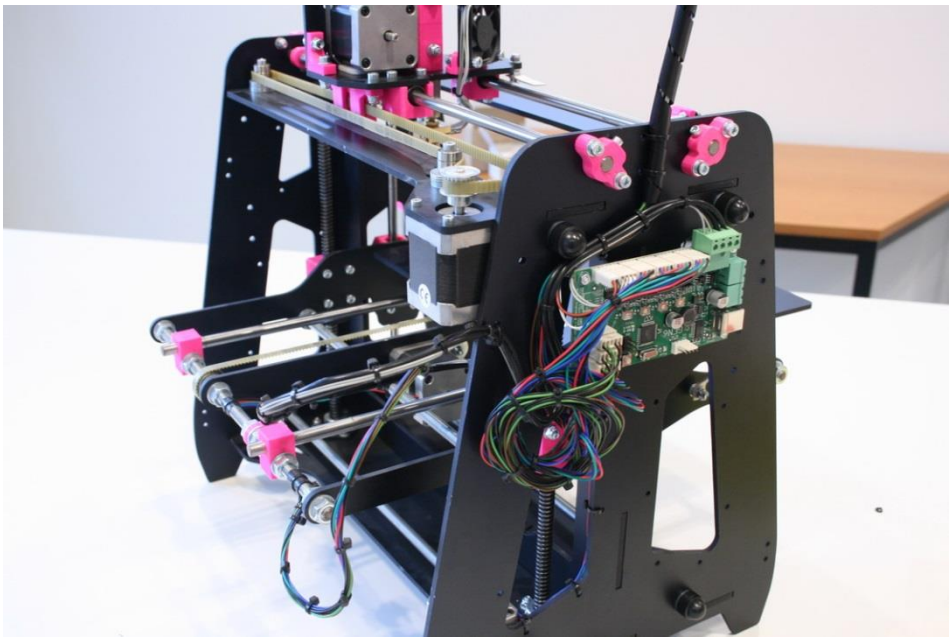


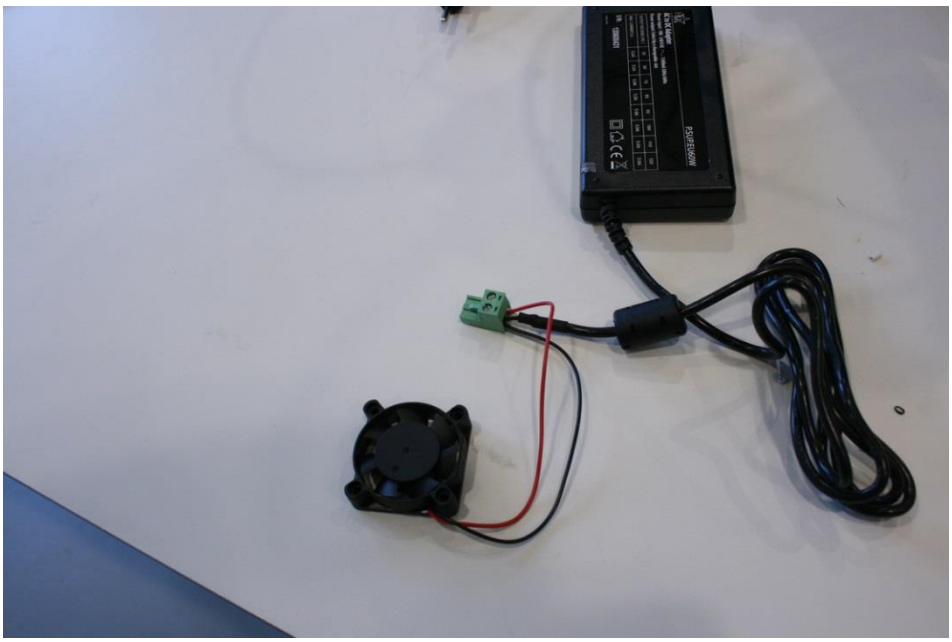


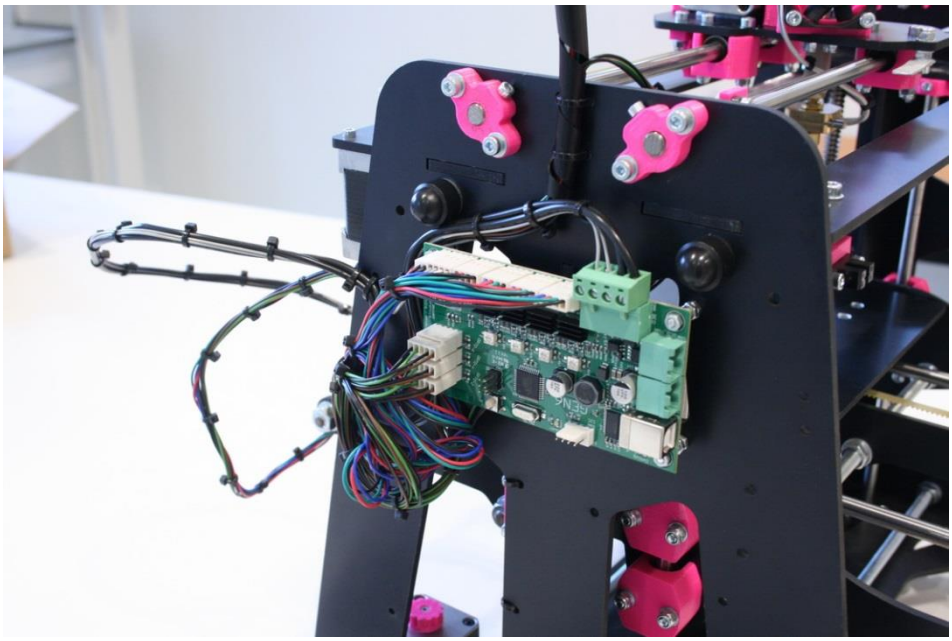


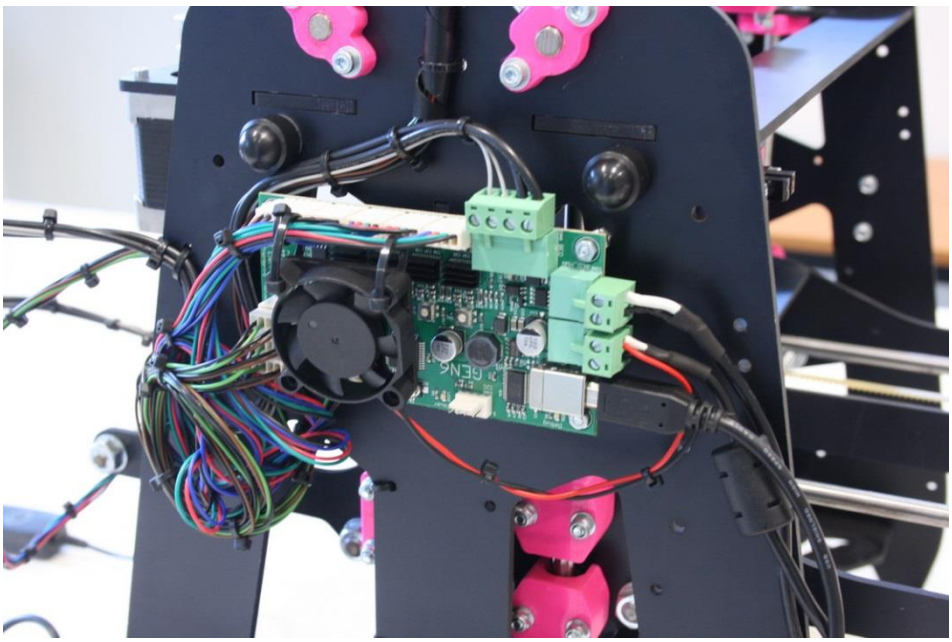
The power adapter for the heated bed (150W) should be set at 24V.

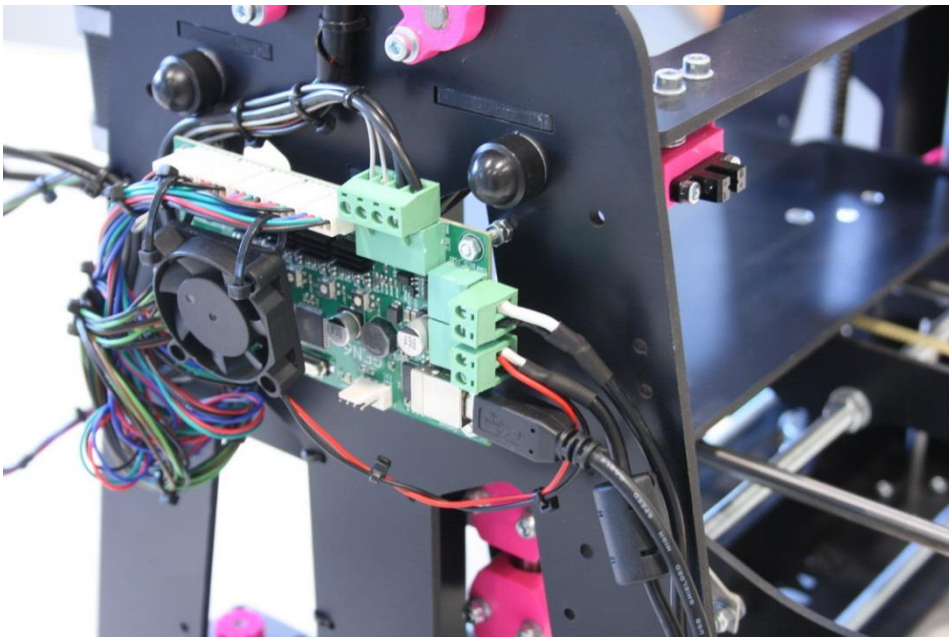
The power adapter for the electronics (70W) should be set at 12V. In the box of the power adapter you can find a small insert to change the voltage to 12V.

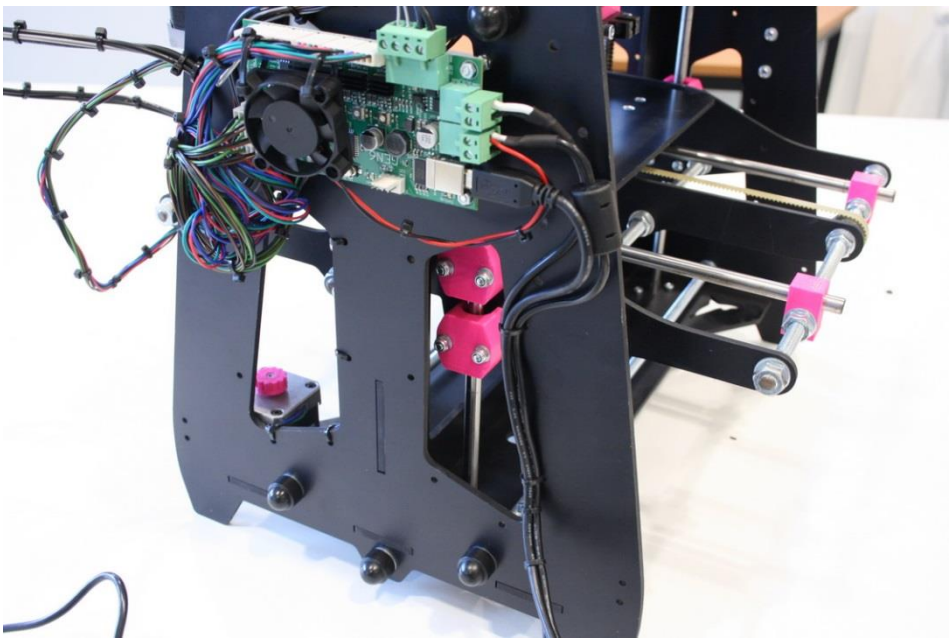


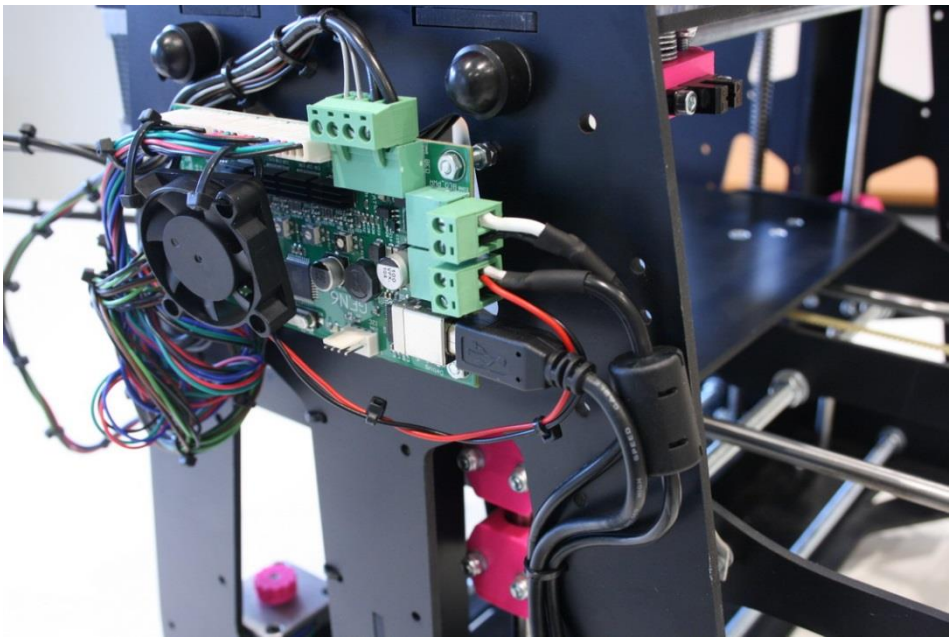


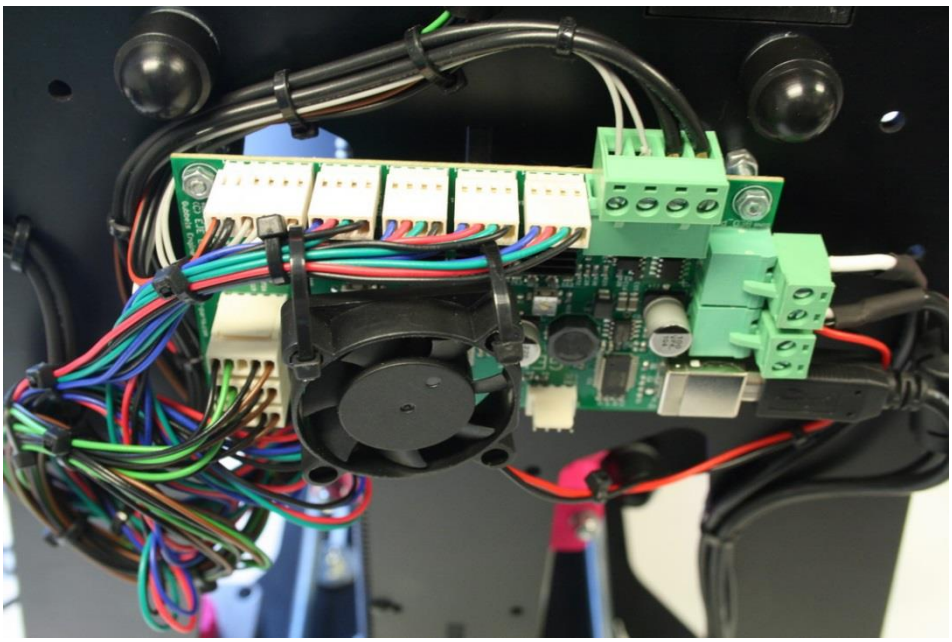












19. Firmware updating and settings

01 - Firmware values and uploading

Firmware values table:

Setting	machine / extruder type	value
X & Y	Orca 0.4x	32.05
Z	Orca 0.4x (ACME 10x3 + T2.5 alu pulleys 20 & 36 teeth)	960
E	Orca 0.4x + extruder **v10B**	169.00

The table below shows the settings for 'older' models.

Setting	machine / extruder type	value
X & Y	Mendel v2	40.05
X & Y	Orca 0.2	40.05
X & Y	Orca 0.30	40.05
Z	Mendel v2 (M8 + T5 pulleys (8 & 21 teeth))	3360
Z	Orca 0.2 (M8 + T5 pulleys (8 & 21 teeth))	3360
Z	Orca 0.30 (M8 + T5 pulleys (8 & 21 teeth))	3360
Z	Orca 0.4x (M10 + T5 pulleys (8 & 21 teeth))	2800
E	Mendel v2 + extr v9	67-76
E	Orca 0.2 + extr v9	67-76
E	Orca 0.30 + extr v9	67-76
E	Orca 0.4x + extr **v10**	136.50

02 - Gen6 deluxe & Orca 0.4x cabling